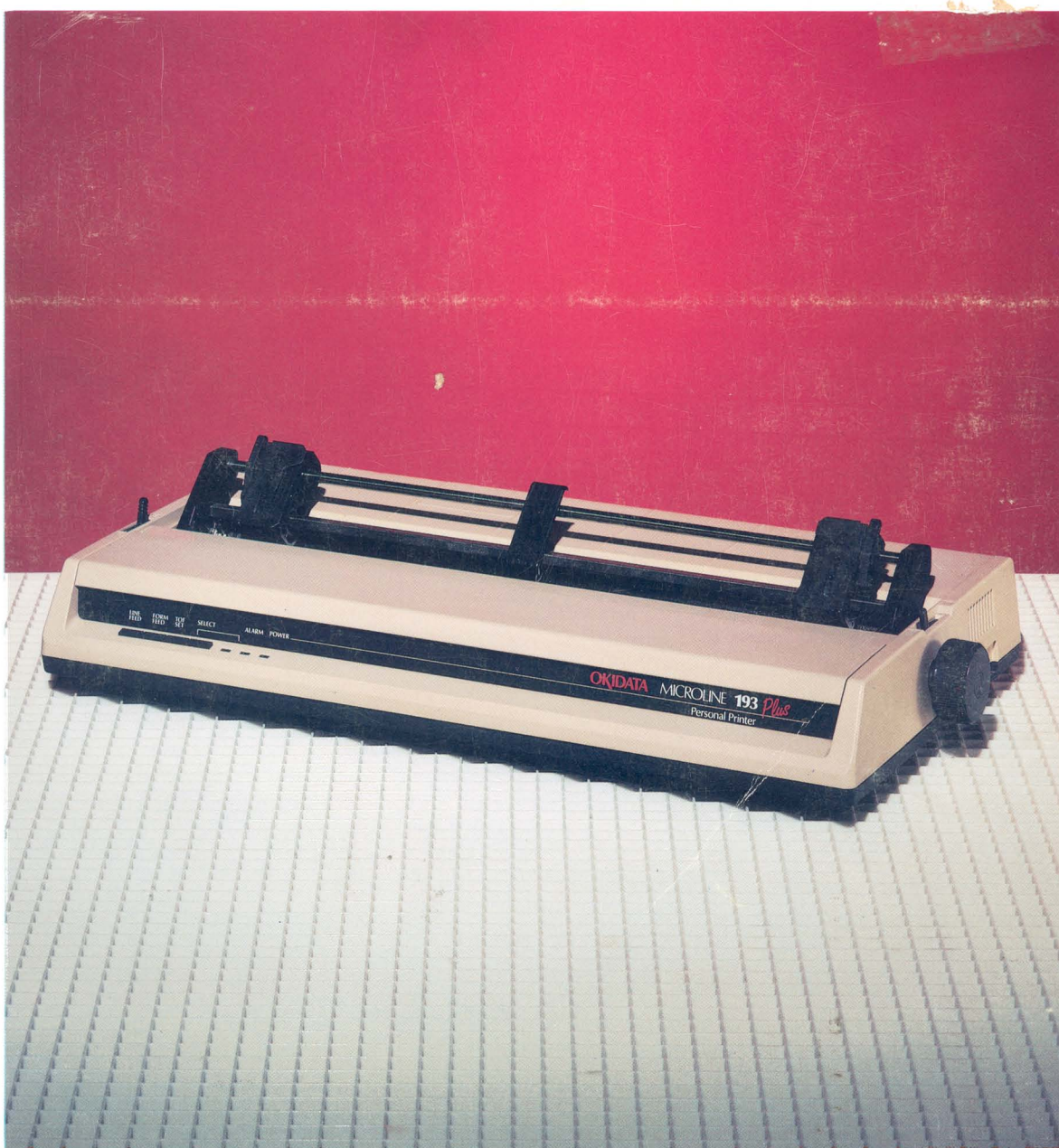


# COMPUTERFACTS™

Technical Service Data

## OKIDATA® MICROLINE 193 PLUS (GE 8251P) PRINTER



FEATURES • COMPLETE SCHEMATICS • PRELIMINARY SERVICE CHECKS • TROUBLESHOOTING TIPS •  
EASY-READ WAVEFORMS • REPLACEMENT PARTS LISTS • SEMICONDUCTOR CROSS-REFERENCE

## PRELIMINARY SERVICE CHECKS

This data provides the user with a time-saving service tool which is designed for quick isolation and repair of Computer system malfunctions.

Check all interconnecting cables for good connection and correct hook-up before making service checks.

Always turn Printer Off before connecting or disconnecting connectors, boards or Computer.

Replacement or repair of the Power Supply, Driver Board, Interface Board or connectors may be necessary after the malfunction has been isolated.

### TEST EQUIPMENT

Digital Volt/Ohm Meter

### TOOLS

Head Cleaning Equipment (Ethyl Alcohol)  
Contact and Switch Cleaner (non-spray type)  
Phillips Screwdriver  
Flat-Blade Screwdriver  
IC Insertion and Removal Tools 28 pin  
Low Wattage Soldering Iron  
Desoldering Equipment

### REPLACEMENTS PARTS AND DESCRIPTION

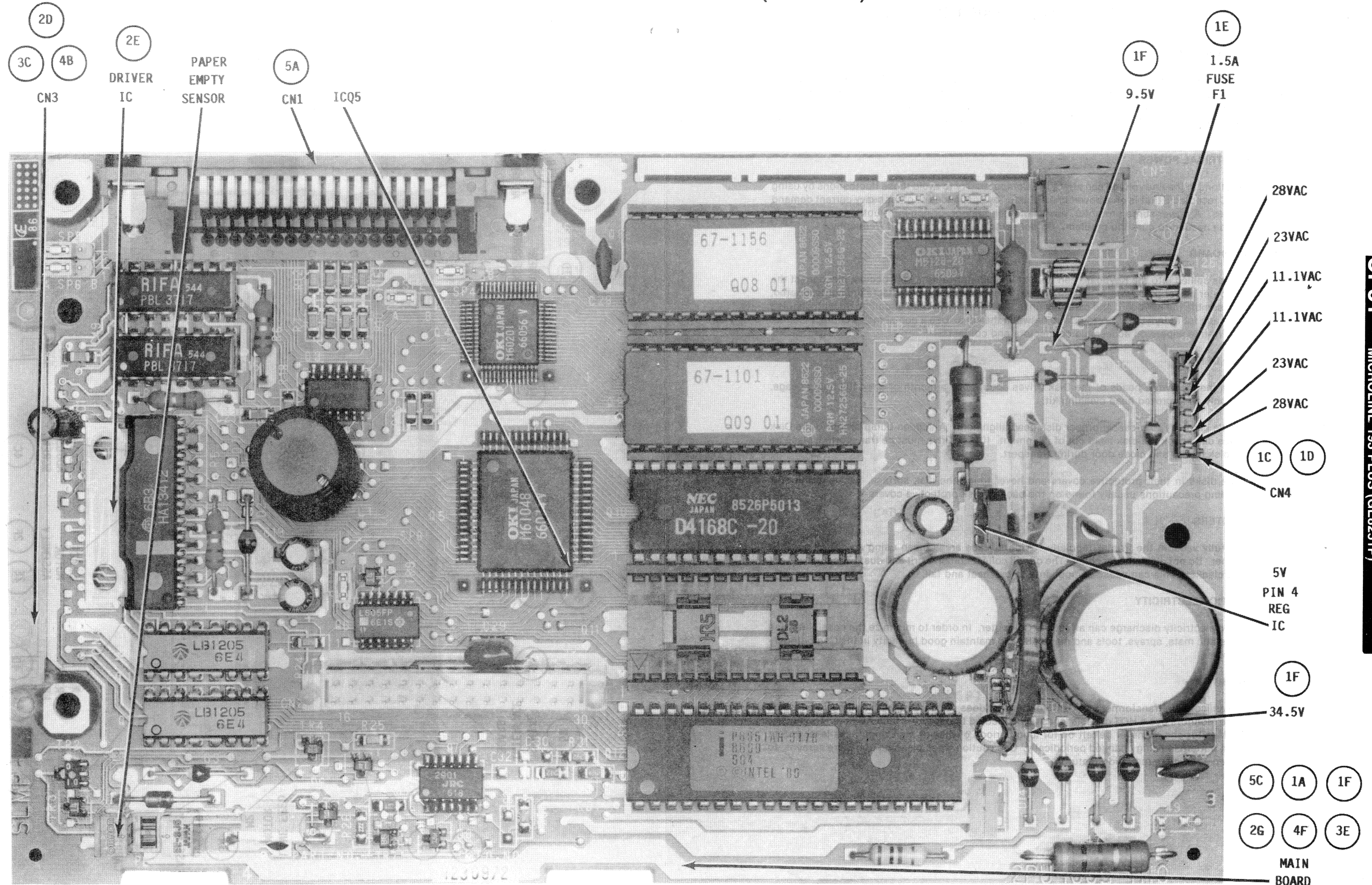
LED 1	Select, Green
LED 2	Alarm, Red
LED 3	Power, Green
M1	Motor, Space (Carriage)
M2	Motor, Line Feed
M3	Printhead
OSC	Crystal, 12MHz
PE	Sensor, Paper Empty
SW1	Switch, Power
SW2	Switch, SASF (Semi-Automatic Sheet Feed)
SW3	Switch, Line Feed
SW4	Switch, Form Feed
SW5	Switch, Top of Form
SW6	Switch, Select



11

[illegible]

# PRELIMINARY SERVICE CHECKS (Continued)



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## **PRELIMINARY SERVICE CHECKS (Continued)**

### **PREVENTATIVE MAINTENANCE**

#### **ENVIRONMENT**

Computers perform best in a clean, cool area that is below 80 degrees Fahrenheit and free of dust and smoke particles. Even though home Computers are not affected by cigarette smoke as much as commercial Computers are affected, it is better to maintain a smoke-free area around the Computer. Do not block cabinet vents of Computer, Monitor, Printer, or other power devices.

#### **ELECTRICAL POWER**

Variations in the line voltage can affect the Computer. Try to avoid these fluctuations by using an AC receptacle that is on a power line not used by appliances or other heavy current demand devices. A power-surge protector, power-line conditioner, or non-interruptible power supply may be needed to cure the problem. **Do not** switch power On and Off frequently.

#### **KEYBOARD**

Liquids spilled into the Keyboard can ruin it. Immediately after a spill occurs, disconnect the Computer power plug from AC power outlet. Then, if circuitry or contacts are contaminated, disassemble the Keyboard and carefully rinse the Keyboard printed circuit board with distilled water and let it dry. Use a cotton swab between the keys. Use a non-abrasive contact cleaner and lint-free wipers on accessible connectors and contacts.

#### **DISK DRIVES**

Clean the read/write heads of the Disk Drives about once a month or after 100 hours usage. Use only an approved head cleaning kit.

Handle carefully to preserve proper disk head alignment. A sudden bump or jolt to the Disk Drives can knock the disk head out of alignment. If Disk Drive must be transported, place an old disk in slot and close door during transport.

Store disks in their protective covers and never touch the disk surface. Observe the disk handling precautions usually found on the back of disk protective covers.

#### **PRINTERS**

Carefully vacuum the Printer regularly. Wipe surface areas clean using a light all-purpose cleaner. Do not clean the machine. The oil will collect abrasive grit and dust. The dust will act as a blanket. This can cause components to overheat and fail.

#### **STATIC ELECTRICITY**

Static electricity discharge can affect the Computer. In order to minimize the possibility, use anti-static mats, sprays, tools and materials, and maintain good humidity in the Computer environment.

#### **MONITOR**

Use an isolation transformer with any Monitor that does not come as part of the system since some Monitors use a HOT chassis (chassis connected to one side of the AC line). The face of the Monitor should never be left on for long periods of time at high brightness level except when pattern is being changed periodically. Use caution when cleaning anti-glare screens, to preserve the glare-reduction feature.



# PRELIMINARY SERVICE CHECKS (Continued)

## DISASSEMBLY INSTRUCTIONS

### UPPER COVER

Remove Access Cover and Platen knob. Remove two screws from front of Upper Cover. Lift front of Upper Cover and slide it back, to remove.

### CONTROL PANEL BOARD

Remove Upper Cover. Release two tabs holding Control Panel Board to Bottom Cover. Disconnect Control Panel Connector from Connector Board and remove Control Panel Board.

### CONTROL BOARD

Remove Upper Cover. Remove screw securing Power Transformer ground wire. Disconnect Connector CN4. Remove five screws securing Control Board and remove Control Board from Printer.

### POWER TRANSFORMER

Remove Upper Cover. Disconnect Connector CN4 from Control Board. Remove screw securing Power Transformer ground wire and two screws holding Power Transformer to Bottom Cover. Remove AC Power Cord Connector from slot in Bottom Cover and remove Power Transformer from Printer.

### POWER SUPPLY BOARD

Remove Upper Cover and Power Transformer. Pull the Power Supply Board off the Power Transformer pins.

### PRINT HEAD

Remove Access Cover and Ribbon Cartridge. Lift Print Head clamp, located right side of Print Head. Pull Print Head straight up and out of Printer.

### RIBBON FEED GEAR ASSEMBLY

Remove Upper Cover and Ribbon Cartridge.

### SELF TEST

The printer self test is initiated by turning on Printer Power while pressing Line Feed button. Printer will continuously print the character set. The self test can be stopped by pressing the select button.

Release four tabs securing Ribbon Feed Gear Assembly to Carriage Motor Assembly. Lift Ribbon Feed Gear Assembly high enough to remove Carriage Cable. Remove Ribbon Feed Gear Assembly from Printer.

### CARRIAGE MOTOR ASSEMBLY

Remove Upper Cover, Print Head and Ribbon Feed Gear Assembly. Remove Print Head Connector. Remove three screws securing Carriage Motor Assembly from Printer.

### CARRIAGE RACK

Remove Upper Cover, Print Head, Ribbon Feed Gear Assembly and Carriage Motor Assembly. Remove spring from right end of Carriage Rack. Carefully pry left end of Carriage Rack off Printer Mechanism tab. Remove Carriage Rack.

### CARRIAGE CABLE

Remove Upper Cover, Print Head, Ribbon Feed Gear Assembly, Carriage Motor Assembly and Carriage Rack. Release two tabs from Connector Board Cable clamp. Remove Carriage Cable.

### PRINTER MECHANISM

Remove Upper Cover, Control Board and Control Panel Board. Remove four screws securing Printer Mechanism to Bottom Cover and remove Printer Mechanism.

### LINE FEED MOTOR

Remove Upper Cover and Printer Mechanism. Remove two screws securing Line Feed Motor to Printer Mechanism and remove Line Feed Motor.

### PLATEN ASSEMBLY

Remove Upper Cover. Release four tabs, two on each end of Platen, from left and right Platen frames. Pull Platen up and out of Printer.

# PRELIMINARY SERVICE CHECKS (Continued)

## MISCELLANEOUS ADJUSTMENTS

### HEAD GAP ADJUSTMENT

Set Adjustment Lever to Range 1, see Figure 1. Set Paper Lock/Release Lever to lock position. Measure for 0.019 inches  $\pm 0.003$  between Print Head and Platen. If measurement is not correct, depress gear On Adjustment Screw and adjust Screw until gap between Platen and Print Head is correct.

### CARRIAGE RACK/ROLLER ADJUSTMENT

Measure for 0.004 inches  $\pm 0.002$  between Roller and Carriage Rack, see Figure 2. If measurement is not correct, loosen Carriage Motor mounting screws, see Figure 3, and reposition Carriage Motor Assembly until measurement is correct. After the adjustment, attach a tension gauge to right side of Ribbon Feed Gear Assembly and ensure Carriage travel load (without Ribbon Cartridge) is less than 0.33 lbs, see Figure 3.

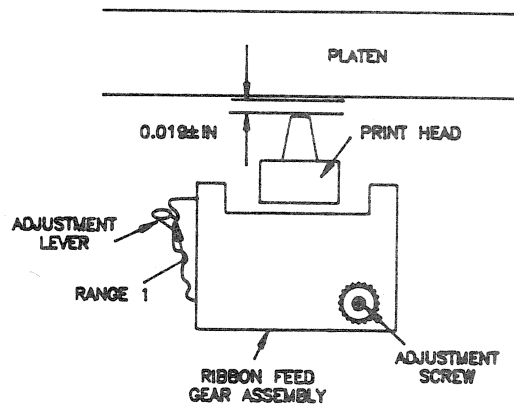


FIGURE 1

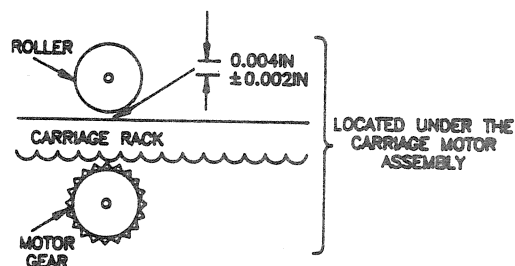


FIGURE 2

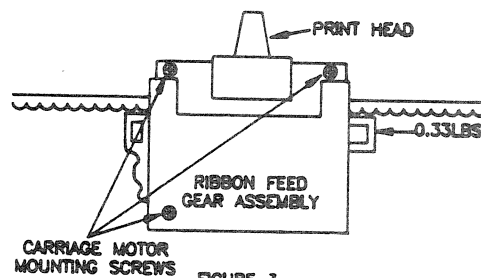


FIGURE 3

# **(b) PRELIMINARY SERVICE CHECKS (Continued)**

## **SERVICE CHECKS**

MATCH THE NUMBERS ON THE INTERCONNECTING DIAGRAM AND PHOTOS WITH THE NUMBERS ON THE SERVICE CHECKS TO BE PERFORMED.

### **① PRINTER DEAD**

- (A) Check AC Fuse (F1).
- (B) Check for 120VAC across Power Transformer primary winding. If voltage is missing, check AC Filter Board by substitution.
- (C) Check Connector CN4 for good connection.
- (D) Check for 8.3VAC between pins 2 and 5, 28.0VAC between pins 3 and 4 of Connector CN4. If any voltage is missing, check Power Transformer by substitution.
- (E) Check Main Board Fuse (F1).
- (F) Check for 9.5V at cathode of Diode D10, 5.0V at pin 3 of Regulator IC (IC2) and 34.5V at cathode of Diode D14. If any voltage is missing, check Main Board by substitution.

### **② PRINTER CARRIAGE ASSEMBLY FAILS TO MOVE OR MOVES ERRATICALLY**

- (A) Inspect Carriage Rack for damage.
- (B) Check Carriage Rack/Roller Adjustment.
- (C) Check Carriage Cable.
- (D) Check Connector Board and Connector CN3.
- (E) Check for 20 ohms between pins 13 and 16, 17 and 18 of Connector CN3. If resistance is not correct, check Carriage Motor Assembly by substitution.

- (F) Manually move Carriage Assembly and check for pulses on pins 55 and 56 of Controller IC (Q5). If pulses are missing, check Carriage Motor Assembly by substitution.

- (G) Check Main Board by substitution.

### **③ LINE FEED MOTOR MALFUNCTIONING**

- (A) Check Gear Assembly.
- (B) Check Connector Board and Connector CN3.
- (C) Check for 22 ohms between pins 38 and 39 and pins 36 and 37 of Connector CN3. If resistance is not correct, check Line Feed Motor (M2) by substitution.
- (D) Check Main Board by substitution.

### **④ PRINT HEAD MALFUNCTIONING**

- (A) Check Print Head face for damage or contamination.
- (B) Check Print Head Connector (CN6), Connector Board and Connector CN3.
- (C) Check Head Gap Adjustment.
- (D) Remove Print Head from Printer and check Print Head resistance. If resistance is not correct, replace Print Head.

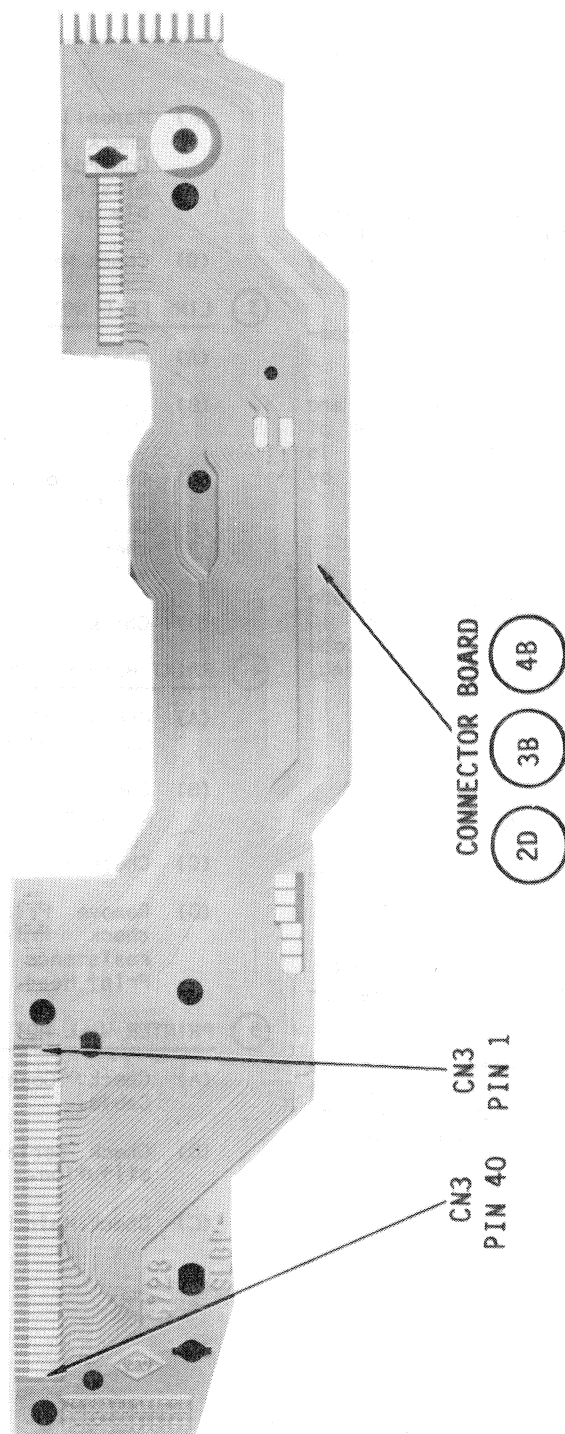
### **⑤ PRINTER WILL NOT RECEIVE DATA**

- (A) Check Connector CN1 and Interface Cable.
- (B) Check Serial Interface Board by substitution.
- (C) Check Main Board by substitution.

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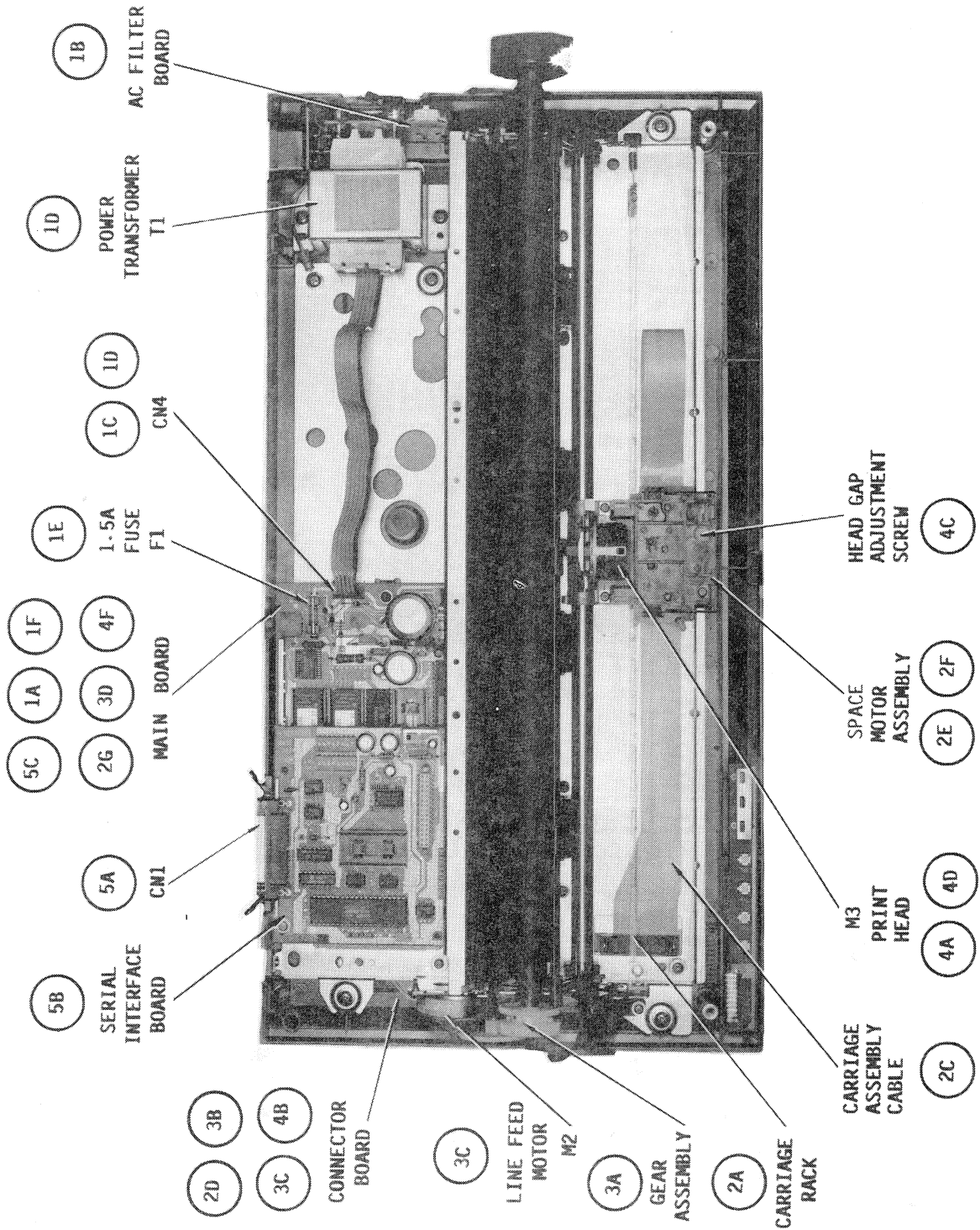


## PRELIMINARY SERVICE CHECKS (Continued)



CONNECTOR BOARD

# PRELIMINARY SERVICE CHECKS (Continued)

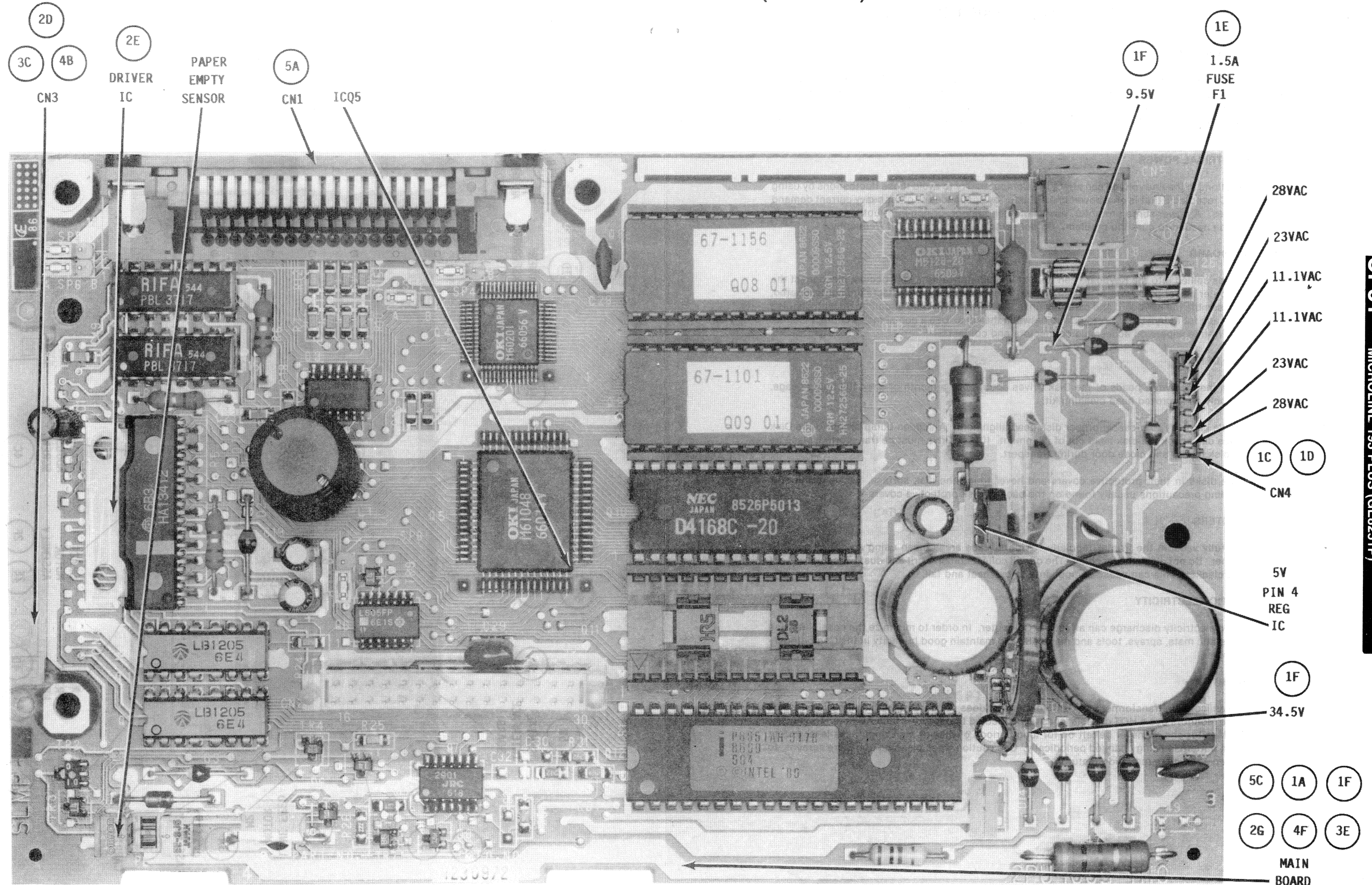


OKIDATA MODEL  
MICROLINE 193 PLUS (GE8251P)

CHASSIS-OVERALL VIEW



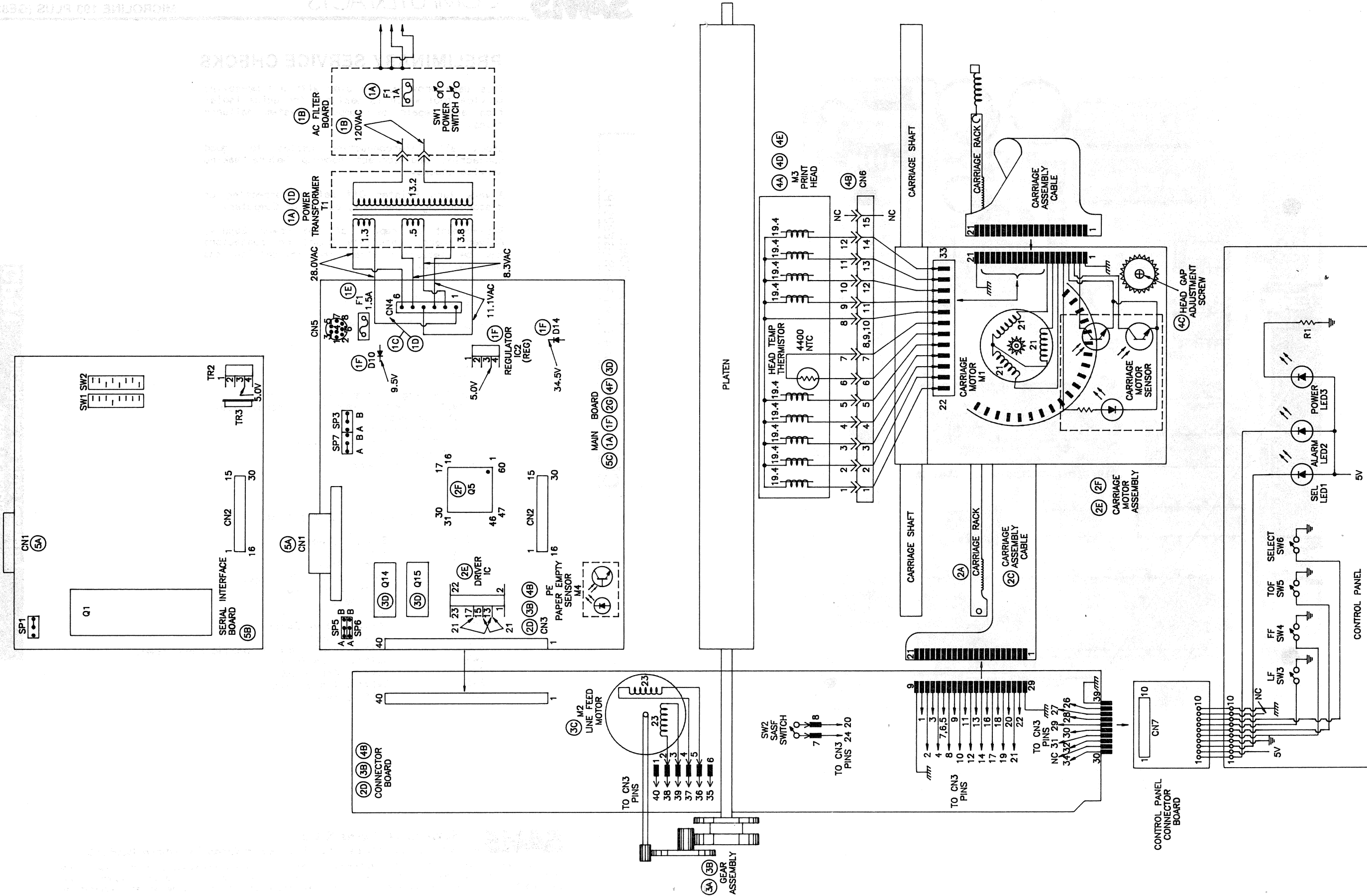
# PRELIMINARY SERVICE CHECKS (Continued)



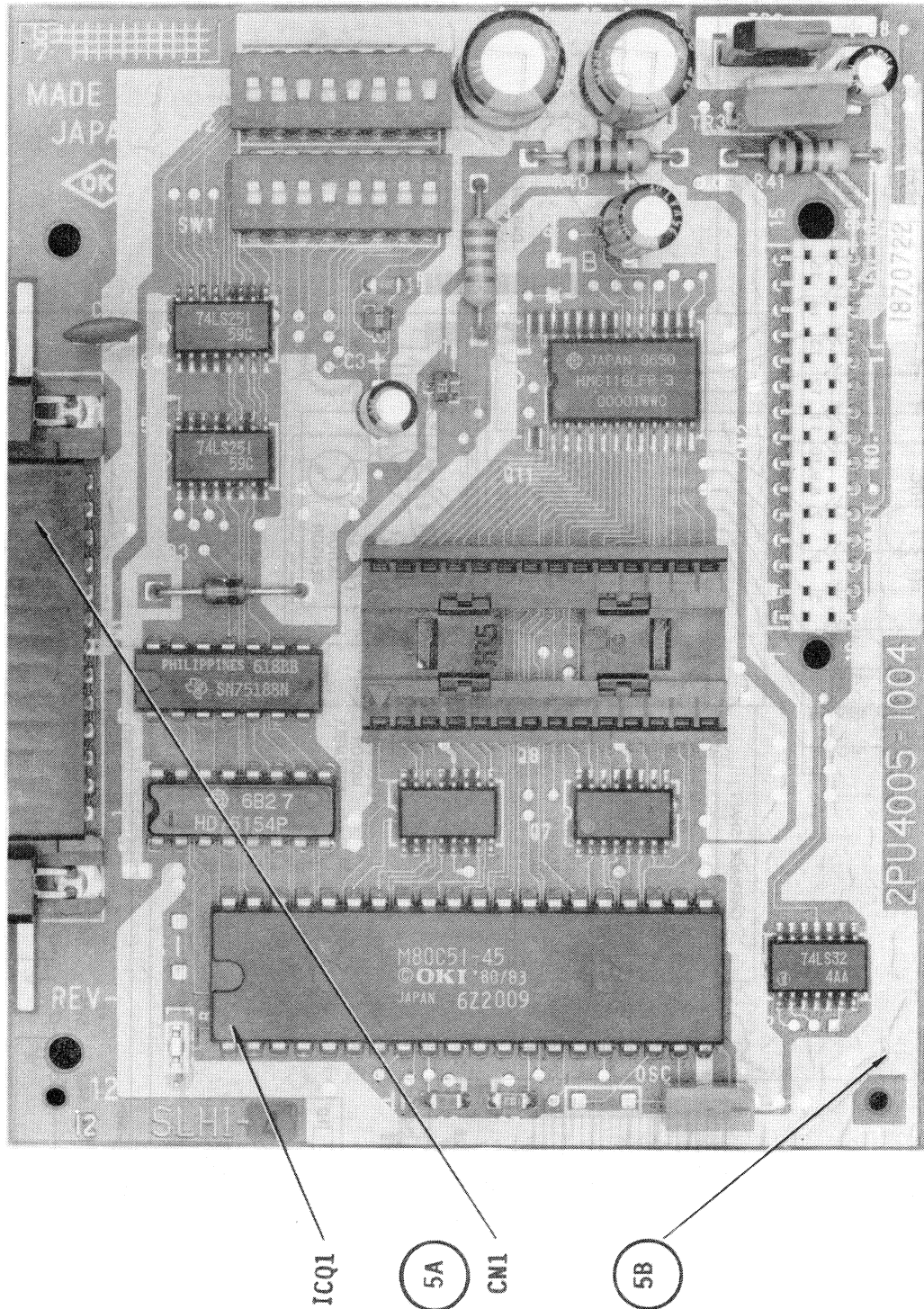
OKIDATA MODEL  
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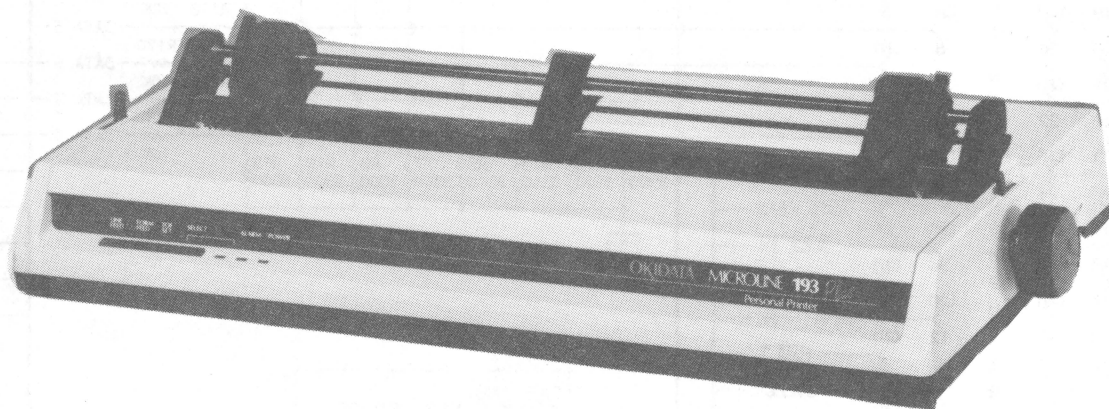


PRELIMINARY SERVICE CHECKS (Continued)



## PRELIMINARY SERVICE CHECKS (Continued)





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MICROLINE 193 PLUS (GE8251P)  
CP51

## SAFETY PRECAUTIONS

See Page 11

## PRELIMINARY SERVICE CHECKS

ENCLOSED

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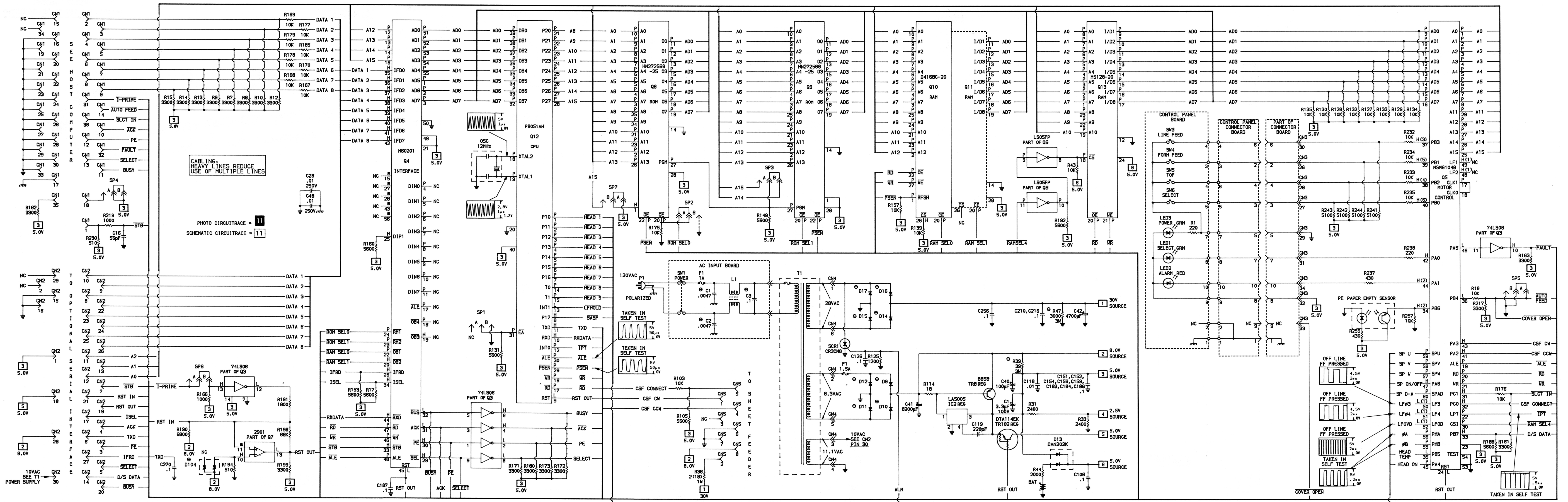
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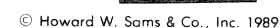
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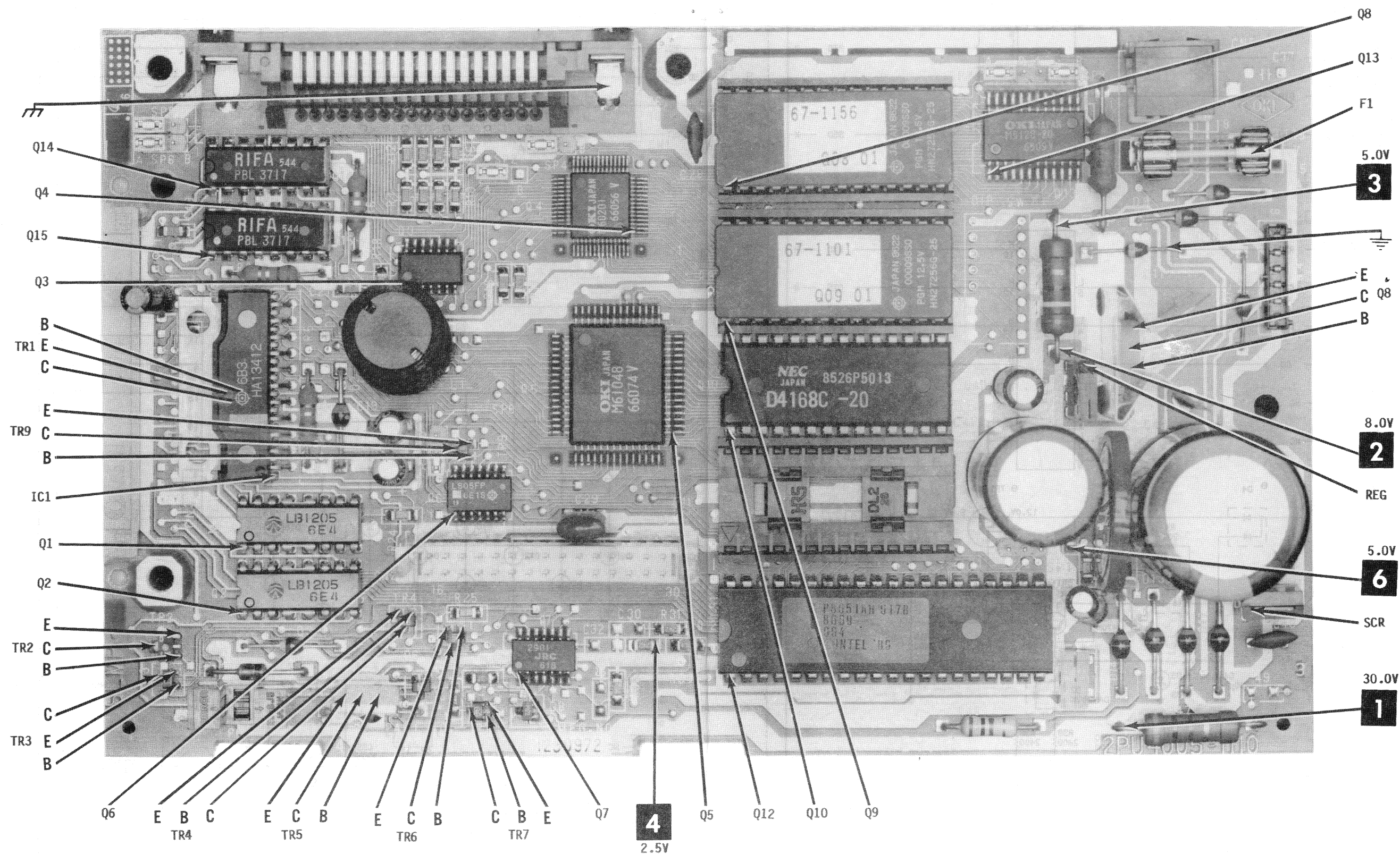
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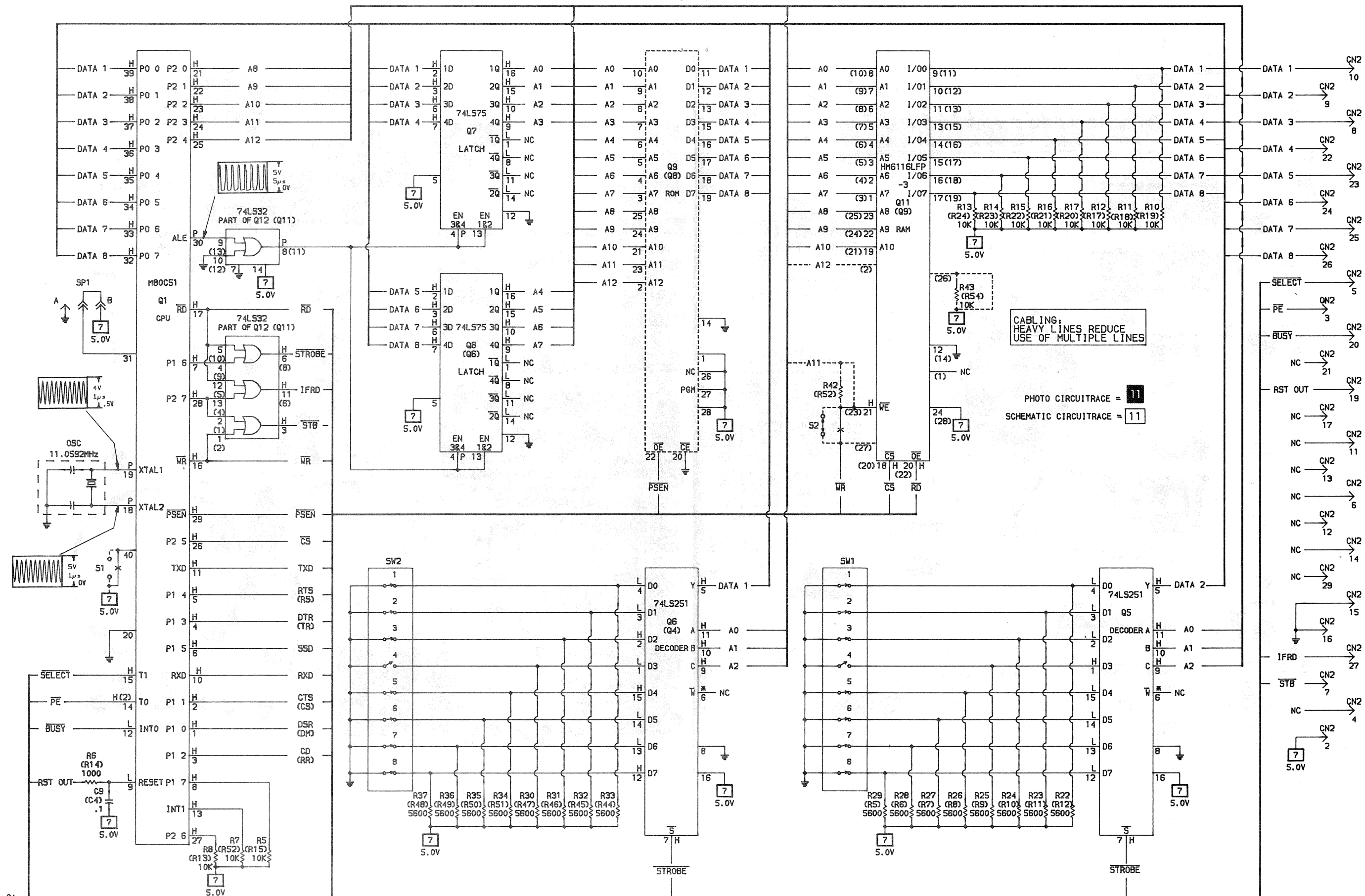
MAIN BOARD - TOP VIEW

A Howard W. Sams CIRCUITRACE<sup>®</sup> Photo

MAIN BOARD - TOP VIEW



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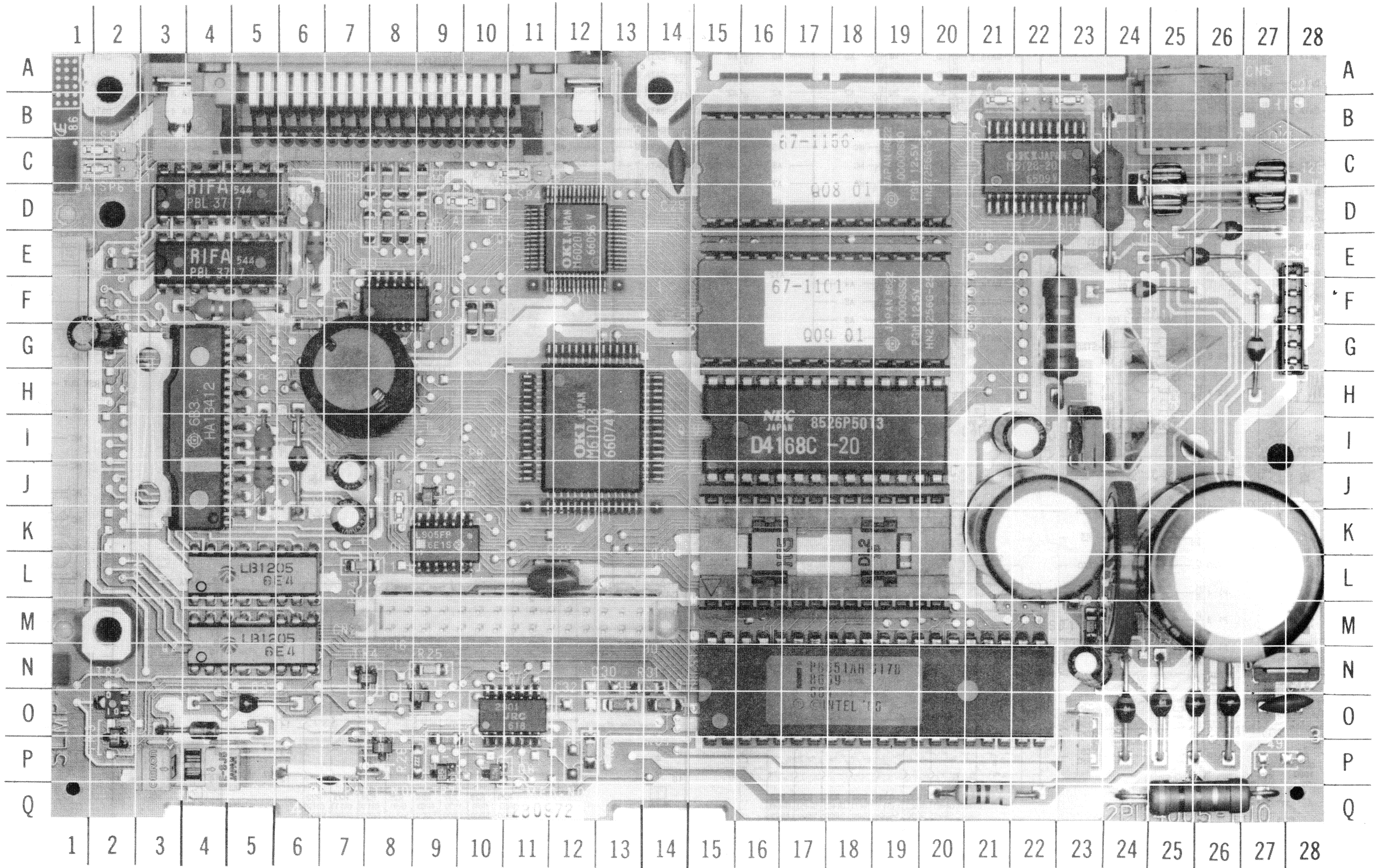


A PHOTOFAC STANDARD NOTATION SCHEMATIC

WITH **CIRCUITRACE<sup>®</sup>**

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MICROLINE 193 PLUS (GE8251P)

MAIN BOARD - TOP VIEW

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MAIN BOARD - TOP VIEW



# MAIN BOARD - TOP- GridTrace LOCATION GUIDE

BATT	L-24	D10	E-26	Q14	D-3	R38	C-24
C1	G-2	D11	F-24	Q15	F-3	R39	F-23
C16	F-10	D12	G-27	R2	F-4	R43	L-23
C19	J-7	D13	M-24	R3	H-5	R44	M-23
C20	K-7	D14	O-24	R4	I-3	R46	Q-21
C21	G-6	D15	O-25	R5	I-5	R47	Q-26
C28	C-14	D16	O-26	R6	E-6	REG	I-23
C29	L-12	D17	O-26	R7	D-7	SCR	N-28
C40	I-22	F1	C-26	R8	D-8	SP1	M-22
C41	K-22	IC1	K-4	R9	D-8	SP2	D-9
C42	L-26	L1	H-7	R10	D-9	SP3	B-23
C45	N-23	OSC	P-23	R12	C-7	SP4	C-11
C48	O-28	PAPER	P-3	R13	C-8	CP5	C-2
C49	E-2	EMPTY		R14	C-8	SP6	C-2
CN1	A-5	Q1	L-4	R15	C-9	SP7	B-21
CN2	M-8	Q2	N-4	R17	F-10	SP8	K-8
CN3	L-1	Q3	G-7	R18	F-7	TR1	I-3
CN4	G-28	Q4	E-13	R24	L-7	TR2	O-2
CN5	A-25	Q5	J-14	R25	N-9	TR3	P-2
D2	I-6	Q6	L-9	R26	P-9	TR4	N-7
D3	O-5	Q7	P-10	R27	P-9	TR5	P-7
D4	O-4	Q8	D-15	R31	N-14	TR6	O-9
D6	P-8	Q9	G-15	R33	O-13	TR7	P-9
D7	P-5	Q10	J-15	R34	O-14	TR8	H-24
D8	P-10	Q12	P-15	R36	P-12	TR9	J-9
D9	D-26	Q13	D-21				

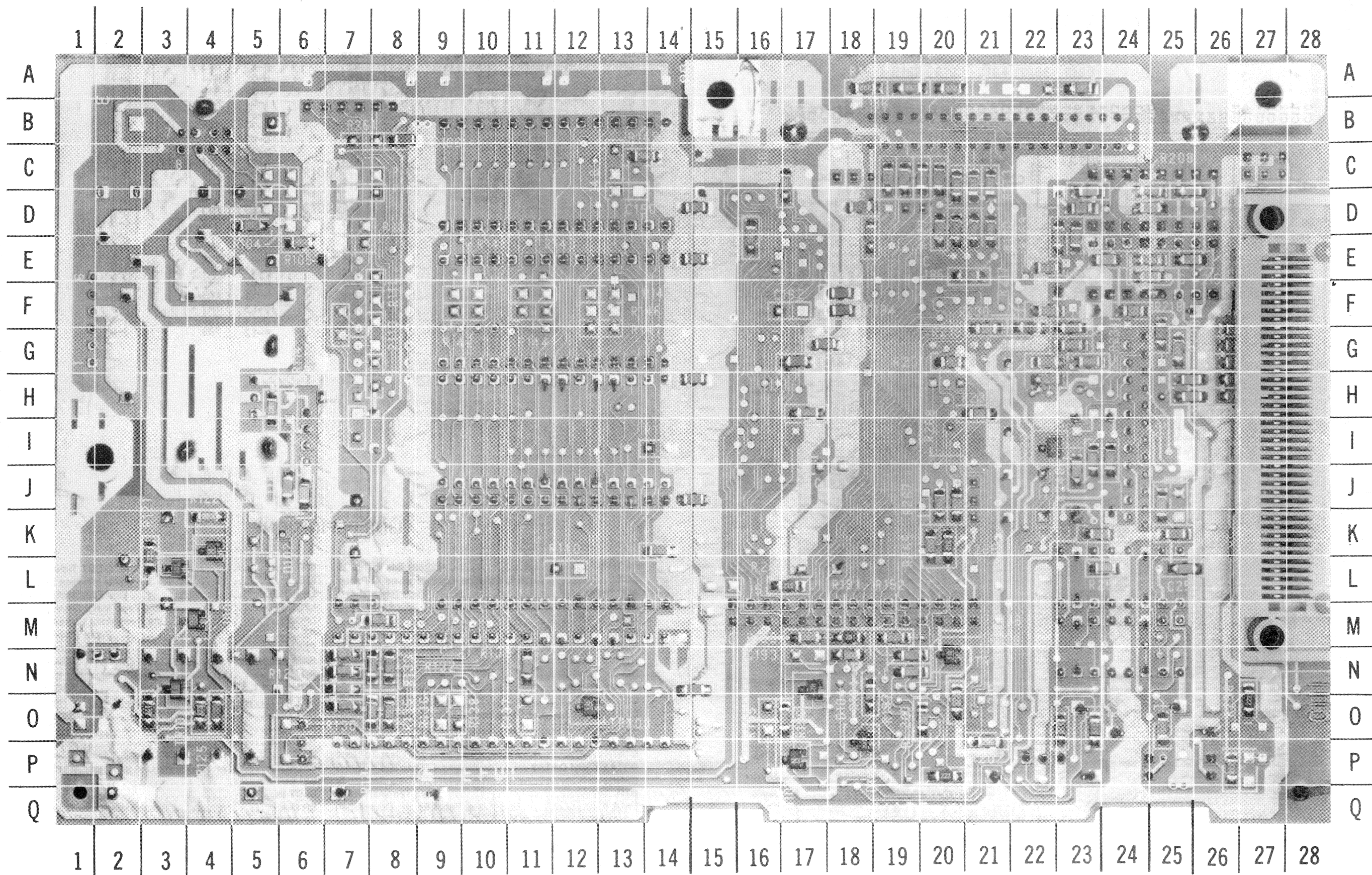
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MICROLINE 193 PLUS (GE8251P)

## LINE DEFINITIONS

**A0 THRU A15** ..... Address Bits 0 Thru 15  
**ACK** ..... Acknowledge, Data Received At Printer  
**AD0 THRU AD7** ..... Data Bits 0 Thru 7  
**ALE** ..... Address Latch Enable  
**ALM** ..... Alarm, Circuit Fault  
**AUTO FEED** ..... Automatic Paper Feed  
**BUSY** ..... Busy, Off Line, Data Entry, Printer Feed, Printing  
**CD** ..... Carrier Detect  
**COVER OPEN** ..... Printer Cover Open Switch  
**CS** ..... Chip Select  
**CSF CCW** ..... Cut Sheet Feeder Motor Counter Clockwise  
**CSF CONNECT** ..... Cut Sheet Feeder Motor Connect  
**CSF CW** ..... Cut Sheet Feeder Motor Clockwise  
**CTS** ..... Clear To Send  
**DATA1 THRU DATA8** ..... Data Bits 1 Thru 8  
**DSR** ..... Data Set Ready  
**DTR** ..... Data Terminal Ready  
**FAULT** ..... Error State, Paper Empty, Cover Open  
**HD ALARM** ..... Print Head Alarm, Overvoltage And Overcurrent Protection  
**HEAD 1 THRU HEAD 9** ..... Print Head Driving Pulses 1 Thru 9  
**HEAD ON** ..... Print Head Enable  
**HEAD TEMP** ..... Print Head Motor Overheat Protection  
**I-PRIME** ..... Input Prime, Clears Memory, Initializes System

**IPT** ..... DDT Timing Signal  
**ISEL** ..... Parallel Interface Selection  
**LF HOLD** ..... Line Feed Motor Enable  
**LF03, LF04** ..... Line Feed Motor Driving Pulses  
**LFODV** ..... Line Feed Motor Current Control  
**PE** ..... Paper Empty Sensor  
**PSEN** ..... Program Store Enable  
**RAM SEL0,1,4** ..... RAM Select  
**RD** ..... Read, Memory Or I/O Device  
**ROM SEL0,1** ..... ROM Select  
**RST IN** ..... Reset Input  
**RST OUT** ..... Reset Output  
**RTS** ..... Request To Send  
**RX DATA** ..... Received Data  
**SASF** ..... Semi-Automatic Sheet Feed  
**SELECT** ..... Select Line Indicates On Line Status  
**SELECT IN** ..... Select Input  
**SLCT IN** ..... Select Input  
**SP D-A** ..... Space Motor Drive Time Control  
**SP ON/OFF** ..... Space Motor Speed Up  
**SP U,SP,V,SP,W** ..... Space Motor Driving Pulses  
**SP ALARM** ..... Space Motor Alarm, Overvoltage And Overcurrent Protection  
**STB** ..... Strobe  
**TXD** ..... Transmitted Data  
**WR** ..... Write, Data Bus Info Stored In Memory Or I/O





OKIDATA MODEL  
MICROLINE 193 PLUS (GE8251P)

MAIN BOARD - BOTTOM VIEW

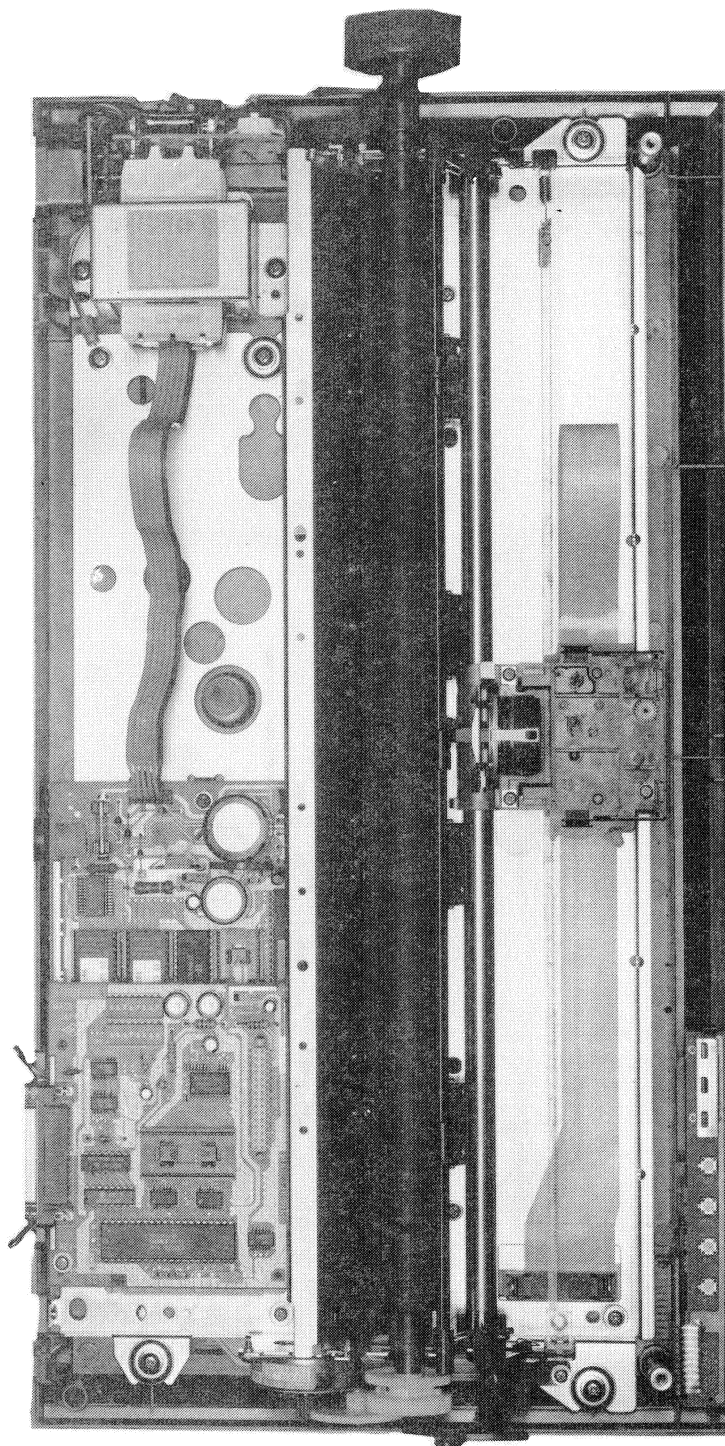
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MAIN BOARD - BOTTOM VIEW



# MAIN BOARD - BOTTOM GridTrace LOCATION GUIDE

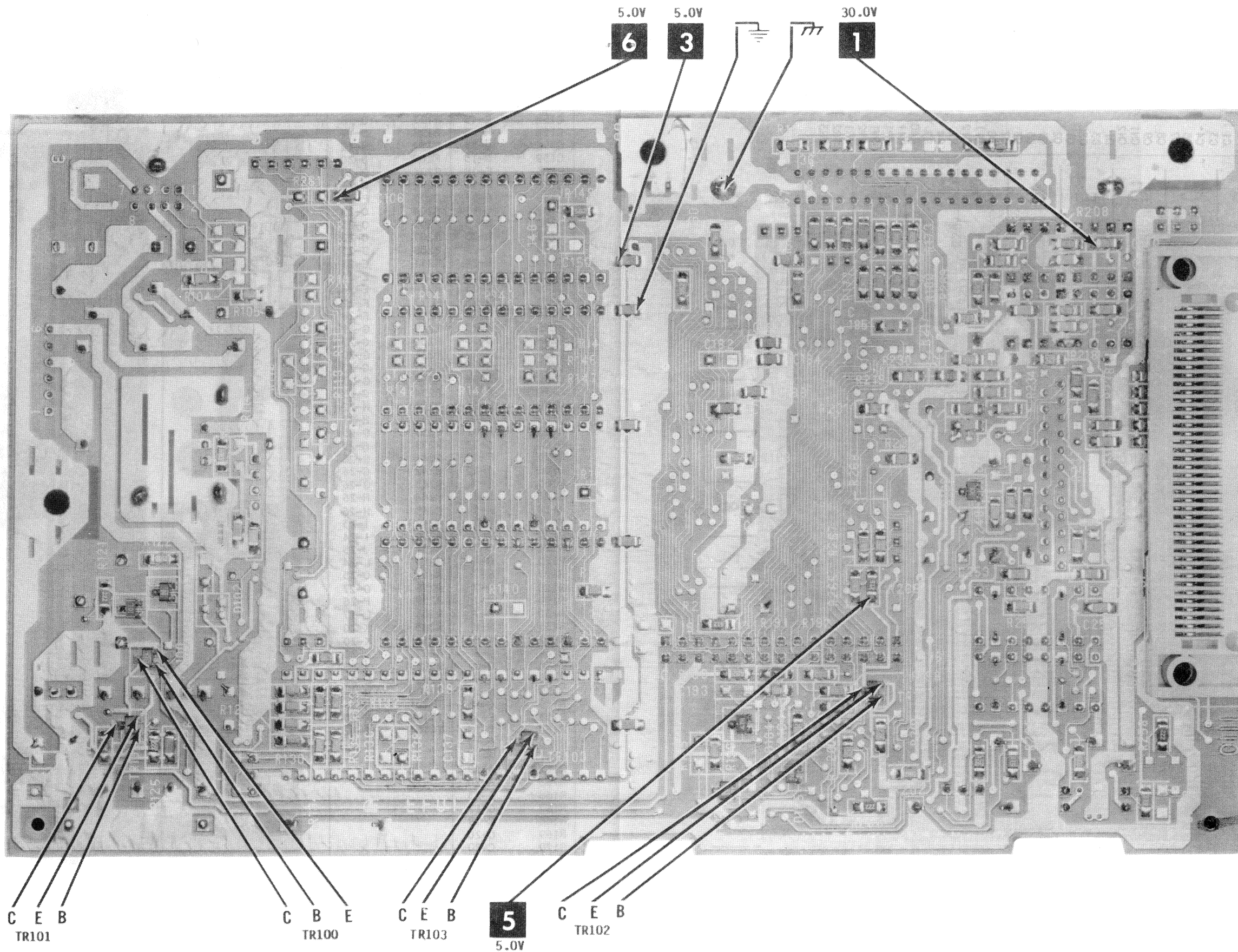
C106	B-8	R190	M-17
C118	J-6	R191	M-18
C119	J-6	R192	M-19
C126	O-4	R194	N-18
C151	D-15	R196	O-17
C152	E-15	R197	O-18
C154	H-15	R198	N-19
C156	J-15	R199	N-19
C159	N-15	R200	O-20
C183	F-18	R201	O-20
C184	F-18	R202	P-21
C186	G-17	R203	P-20
C187	G-17	R204	O-23
C206	D-23	R205	O-23
C209	D-25	R207	D-23
C210	D-25	R208	D-25
C213	E-24	R211	E-23
C215	E-24	R212	E-23
C216	E-25	R214	E-24
C239	H-25	R217	F-22
C240	H-25	R218	F-24
C246	G-23	R219	G-21
C248	J-23	R230	G-22
C253	K-23	R231	G-20
C255	K-25	R232	G-23
C256	L-25	R233	G-23
C270	F-27	R234	G-23
D100	L-3	R235	H-22
D101	K-4	R236	H-21
D103	P-17	R237	G-25
D104	N-17	R238	G-25
D105	P-18	R241	G-26
D106	I-22	R242	G-26
R103	D-5	R243	G-26
R105	E-6	R244	H-26
R114	H-5	R245	H-26
R121	L-3	R249	I-23
R122	K-4	R250	I-24
R124	O-3	R251	J-25
R125	O-4	R254	L-24
R127	N-7	R257	O-25
R128	N-7	R258	O-27
R129	N-7	R259	P-26
R130	O-7	R264	L-17
R131	M-8	R265	K-20
R132	N-8	R266	K-20
R133	N-8	R267	J-20
R134	O-8	R268	J-20
R135	O-8	R269	E-22
R139	N-11	TR100	M-4
R149	C-13	TR101	N-3
R153	E-16	TR102	N-20
R157	K-14	TR103	O-12
R160	C-17		
R161	A-18		
R162	A-19		
R163	A-20		
R166	A-23		
R167	C-17		
R168	C-19		
R169	C-20		
R170	C-20		
R171	C-20		
R172	C-21		
R173	C-21		
R175	D-18		
R176	E-18		
R177	D-20		
R178	D-20		
R179	D-21		
R180	D-21		
R185	E-21		
R188	H-17		



**CP51**  
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MICROLINE 193 PLUS (GE8251P)

CHASSIS-OVERALL VIEW





MAIN BOARD - BOTTOM VIEW

A Howard W. Sams CIRCUITRACE Photo

MAIN BOARD - BOTTOM VIEW



## SAFETY PRECAUTIONS

1. Use an isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the Printer before servicing or installing electrostatically sensitive devices. Examples of typical ES devices are integrated circuits and semiconductor "chip" components.
4. Use extreme caution when handling the printed circuit boards. Some semiconductor devices can be damaged easily by static electricity. Drain off any electrostatic charge on your body by touching a known earth ground. Wear a commercially available discharging wrist strap device. This should be removed prior to applying power to the unit under test.
5. Use a grounded-tip, low voltage soldering iron.
6. Use an isolation (times 10) probe on scope.
7. Do not remove or install board, mechanical or electrical parts or other peripherals with Printer AC power On.
8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.
9. This Printer is equipped with a grounded three-pronged AC plug. This plug must fit into a grounded AC power outlet. Do not defeat the AC plug safety feature.
10. Periodically examine the AC power cord for damaged or cracked insulation.
11. The Printer cabinet is equipped with vents to prevent heat build-up. Never block, cover or obstruct these vents.
12. Instructions should be given, especially to children, that objects should not be dropped or pushed into the vents of the cabinet. This could cause shock or equipment damage.
13. Never expose the Printer to water. If exposed to water, turn the unit Off. Do not place the Printer near possible water sources.
14. Never leave the Printer unattended or plugged into the AC outlet for long periods of time. Remove AC plug from AC outlet during lightning storms.
15. Do not allow anything to rest on AC power cord.
16. Unplug AC power cord from outlet before cleaning Printer.
17. Never use liquids or aerosols directly on the Printer. Spray on cloth and then apply to the Printer cabinet. Make sure the Printer is disconnected from the AC power line.

## DISASSEMBLY INSTRUCTIONS

### UPPER COVER

Remove Access Cover and Platen knob. Remove two screws from front of Upper Cover. Lift front of Upper Cover and slide it back, to remove.

### CONTROL PANEL BOARD

Remove Upper Cover. Release two tabs holding Control Panel Board to Bottom Cover. Disconnect Control Panel Connector from Connector Board and remove Control Panel Board.

### CONTROL BOARD

Remove Upper Cover. Remove screw securing Power Transformer ground wire. Disconnect Connector CN4. Remove five screws securing Control Board and remove Control Board from Printer.

### POWER TRANSFORMER

Remove Upper Cover. Disconnect Connector CN4 from Control Board. Remove screw securing Power Transformer ground wire and two screws holding Power Transformer to Bottom Cover. Remove AC Power Cord Connector from slot in Bottom Cover and remove Power Transformer from Printer.

### POWER SUPPLY BOARD

Remove Upper Cover and Power Transformer. Pull the Power Supply Board off the Power Transformer pins.

### PRINT HEAD

Remove Access Cover and Ribbon Cartridge. Lift Print Head clamp, located right side of Print Head. Pull Print Head straight up and out of Printer.

### RIBBON FEED GEAR ASSEMBLY

Remove Upper Cover and Ribbon Cartridge.

Release four tabs securing Ribbon Feed Gear Assembly to Carriage Motor Assembly. Lift Ribbon Feed Gear Assembly high enough to remove Carriage Cable. Remove Ribbon Feed Gear Assembly from Printer.

### CARRIAGE MOTOR ASSEMBLY

Remove Upper Cover, Print Head and Ribbon Feed Gear Assembly. Remove Print Head Connector. Remove three screws securing Carriage Motor Assembly from Printer.

### CARRIAGE RACK

Remove Upper Cover, Print Head, Ribbon Feed Gear Assembly and Carriage Motor Assembly. Remove spring from right end of Carriage Rack. Carefully pry left end of Carriage Rack off Printer Mechanism tab. Remove Carriage Rack.

### CARRIAGE CABLE

Remove Upper Cover, Print Head, Ribbon Feed Gear Assembly, Carriage Motor Assembly and Carriage Rack. Release two tabs from Connector Board Cable clamp. Remove Carriage Cable.

### PRINTER MECHANISM

Remove Upper Cover, Control Board and Control Panel Board. Remove four screws securing Printer Mechanism to Bottom Cover and remove Printer Mechanism.

### LINE FEED MOTOR

Remove Upper Cover and Printer Mechanism. Remove two screws securing Line Feed Motor to Printer Mechanism and remove Line Feed Motor.

### PLATEN ASSEMBLY

Remove Upper Cover. Release four tabs, two on each end of Platen, from left and right Platen frames. Pull Platen up and out of Printer.

## SCHEMATIC NOTES

- ▽ Isolated ground
- Circuitry not used in some versions
- Circuitry used in some versions
- See parts list
- ≡ Ground

Voltages measured with digital meter.  
Waveforms and voltages taken from ground, unless noted otherwise.  
All measurements taken with Printer in Draft Self-Test mode unless noted.  
Supply voltage maintained as shown at Input. Controls adjusted for normal operation.  
Terminal Identification may not be found on unit.  
Capacitors are 50 volts or less, 5% unless noted.  
Electrolytic capacitors are 50 volts or less, 20% unless noted.  
Resistors are 1/2W or less, 5% unless noted.

Value in ( ) used in some versions.  
Measurements with switching as shown, unless noted.

Logic Probe Display  
L = Low  
H = High  
P = Pulse  
\* = Open (No Lights On)

- (1) Probe Indicates P with Line Feed.
- (2) Probe Indicates L with Paper End.
- (3) Probe Indicates L when Line Feed is pressed.
- (4) Probe Indicates L when T.O.F. switch is pressed.
- (5) Probe Indicates L when Form Feed switch is pressed.
- (6) Probe Indicates L when Select switch is pressed.

## MISCELLANEOUS ADJUSTMENTS

### HEAD GAP ADJUSTMENT

Set Adjustment Lever to Range 1, see Figure 1. Set Paper Lock/Release Lever to lock position. Measure for 0.019 inches  $\pm 0.003$  between Print Head and Platen. If measurement is not correct, depress gear on Adjustment Screw and adjust Screw until gap between Platen and Print Head is correct.

### CARRIAGE RACK/ROLLER ADJUSTMENT

Measure for 0.004 inches  $\pm 0.002$  between Roller and Carriage Rack, see Figure 2. If measurement is not correct, loosen Carriage Motor mounting screws, see Figure 3, and reposition Carriage Motor Assembly until measurement is correct. After the adjustment, attach a tension gauge to right side of Ribbon Feed Gear Assembly and ensure Carriage travel load (without Ribbon Cartridge) is less than 0.33 lbs, see Figure 3.

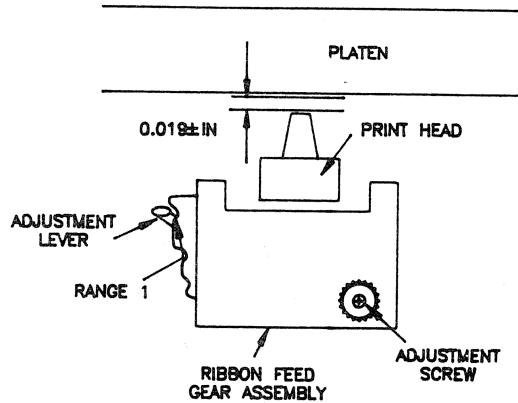


FIGURE 1

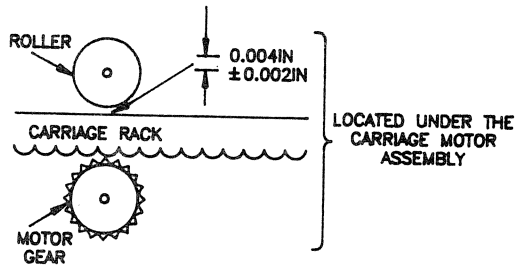


FIGURE 2

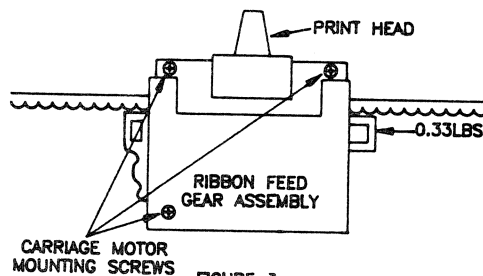
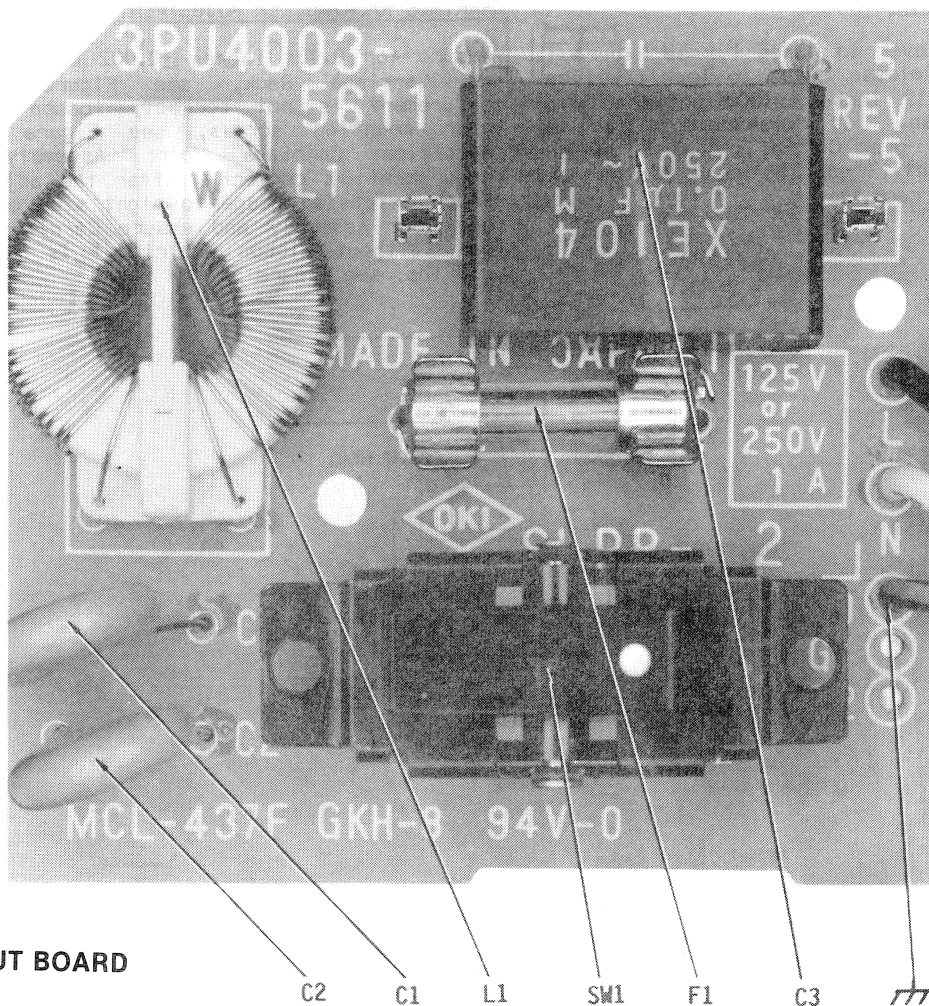


FIGURE 3





**AC INPUT BOARD**

## TEST EQUIPMENT

Test Equipment listed by Manufacturer illustrates typical or equivalent equipment used by SAMS' Engineers to obtain measurements and is compatible with most types used by field service technicians.

### TEST EQUIPMENT

Equipment	B & K Precision Equipment No.	Sencore Equipment No.	Notes
OSCILLOSCOPE	1570A,1590A,1596	SC61	
LOGIC PROBE	DP51,DP21		
LOGIC PULSER	DP101,DP31		
DIGITAL VOM	2830,2806	DVM37,DVM56,SC61	
ANALOG VOM	277,111,116		
ISOLATION TRANSFORMER	TR110,1604,1653,1655	PR57	
FREQUENCY COUNTER	1803,1805	FC71,SC61	
COLOR BAR GENERATOR	1211A,1251,1260,1249	CG25,VA62	
RGB GENERATOR	1260,1249		
FUNCTION GENERATOR	3020,3011,3030		
HI-VOLTAGE PROBE	HV-44	HP200	
VOM/DMM			
Accessory probes	PR-28(HV)		
TEMPERATURE PROBE	TP-28,TP-30		
CRT ANALYZER	467,470	CR70	
DIGITAL IC TESTER	560,550,552		
CAPACITANCE ANALYZER		LC53,LC75,LC76 LC77	
INDUCTANCE ANALYZER		LC53,LC75,LC76 LC77	

## TROUBLESHOOTING

### PRINTER IS DEAD

If printer is dead, check AC Fuse (F1). If open replace fuse and disconnect CN4, apply power. If Fuse F1 opens again, check the AC Filter Board Capacitors (C1 thru C3), and the Power Transformer (T1). If Fuse F1 does not open, check Diodes D14 thru D17 and Electrolytic C42. Connect CN4 connector and check for approximately 5.0V on Alarm SCR (SCR1) gate. If 5.0V is not present, check Alarm SCR by substitution. If 5.0V is present the Alarm circuit has been activated, which indicates a drive circuit problem. Check Alarm Circuit Transistors TR100 and TR101, IC Q7, Diode D100, and associated components.

If AC Filter Board Fuse is good check Main Board Fuse (F1). If open check Diodes D9 thru D12 and Electrolytic C41 for possible shorts. If Main Board Fuse is good check for approximately 120VAC across primary windings of Transformer T1. If missing, check coil L1 for possible open and check operation of Power Switch (SW1).

### CPU OPERATION

Check voltages, logic and waveforms associated with CPU IC (Q12). If waveforms on pins 18 and 19 of IC Q12 are not correct, check Oscillator (OSC) by substitution. If logic is not correct on pin 9, check for 4.6V on pin 10 and 2V on pin 11 of IC Q7. If voltages on pins 10 and 11 of Q7 are correct, check Q7 and components associated with pin 13 of Q7. If voltage on pin 10 of Q7 is not correct, check Resistor R194 and Zener Diode D104. If voltage on pin 10 of Q7 is correct, check Q7 and associated components. If the logic reading at pin 9 of Q12 is correct, check Q12 by substitution.

### CARRIAGE MOTOR

Check for 20 ohms between pins 16 and 17 and between pins 17 and 18 of connector CN3. If resistance is not correct, check carriage motor assembly by substitution. If carriage motor assembly is good, check connector board, connector CN3 and carriage cable. If resistance is correct, check for a logic low on pin 35 of Controller IC (Q5). If logic is high, it indicates the Head Temperature Circuit has been activated. Check for approximately 4.0V on pin 4 of IC Q7. If voltage is less than 2.5V and print head is cool, check print head by substitution. If voltage is correct on pin 4 of IC Q7, check IC Q7 and associated components. If the logic reading on pin 35 of IC Q5 is correct, manually move carriage assembly and check waveforms on pins 55 and 56 of IC Q5. If waveforms are not correct, check carriage motor assembly by substitution. If waveforms are correct on pins 55 and 56 of IC Q5, initiate printer Self-Test. Check waveforms on pins 6, 19, 21 and 23 of Driver IC (IC1). If waveforms are not correct, check Controller IC (Q5) by substitution. If IC Q5 is good, check CPU IC (Q12) by substituting. If waveforms on pins 6, 19, 21 and 23 of IC1 are correct, check waveform on pin 47 of IC Q5. If waveform is not correct check compo-

nents associated with pin 47 of IC Q5. If components are good, check IC Q5 by substitution. If waveform on pin 47 of IC Q5 is correct, check waveforms on pins 13, 15 and 17 of IC1. If waveforms are present, check carriage motor assembly by substitution.

### LINE FEED MOTOR

Check for 22 ohms between pins 38 and 39, and between pins 36 and 37 of connector CN3. If resistance is not correct check Line Feed Motor by substitution. If Line Feed Motor is good, check connector board and connector CN3. Check waveforms on pins 8, 14 and 15 of ICs Q14 and Q15 and check waveforms at pin 11 of ICs Q14 and Q15. All waveforms are checked with the printer OFF line and Form Feed pressed down. If waveforms are not correct on pins 8 and 11 of ICs Q14 and Q15, check Controller IC (Q5) and associated components. Press Form Feed button and check for pulses at pins 12 and 13 of IC Q6. If pulses are present at pin 13 and not present at pin 12, check IC Q6 and TR9 and associated components.

### PRINT HEAD

If characters are printed, but are too light or uneven check Head Gap Adjustment. If Print Head is properly adjusted remove Print Head and check for 20 ohms between pins 1 thru 4, pins 9 thru 13 and pin 6 of the Print Head edge connector. If any resistance is not correct, check Print Head by substitution. If Print Head is good initiate printer self test and check the waveform on pin 22 of controller IC (Q5). If waveform is not correct, check Q5 by substitution.

### SELF TEST

The printer self test is initiated by turning on Printer Power while pressing Line Feed button. Printer will continuously print the character set. The self test can be stopped by pressing the select button.

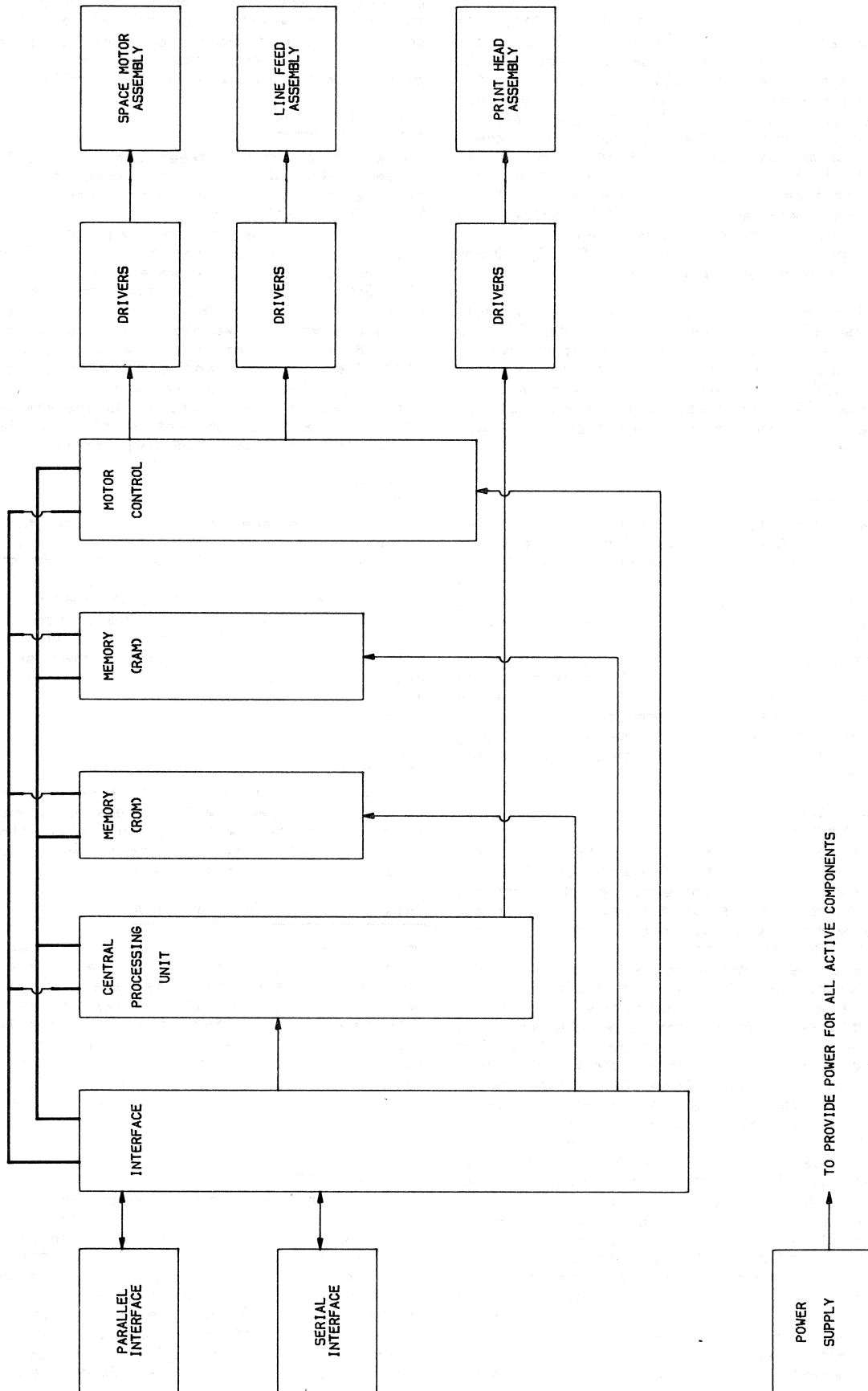
### PRINTER DOES NOT RECEIVE DATA

Printer successfully performs printer self test but does not receive data from host computer. Check the interface cable, check switch settings for SW1 and SW2 on the Serial Interface board. Check the logic readings of ICs Q2 and Q3 and check the oscillator signals at pins 18 and 19 of IC Q1. Check the Controller IC (Q1) on the Serial Interface board, and check the Controller IC (Q5) on the Main board.

### SENSOR OPERATION

Turn on printer without paper installed and check for a logic low at pins 34 and 44 of Controller IC (Q5). Check for a logic low on pin 14 of Controller IC (Q1) on the Serial Interface board, if used. Install paper and check for a logic High at pins 34 and 44 of Controller IC (Q5) on the Main board and at pin 14 of the Controller IC (Q1) on the Serial Interface board. If logic is not correct on all the pins, check Paper Empty Sensor and associated components.

## BLOCK DIAGRAM



## PARTS LIST AND DESCRIPTION

When ordering parts, state Model, Part Number, and Description

### SEMICONDUCTORS (Select replacement for best results)

ITEM No.	MFGR. PART No./ TYPE No.	NTE PART No.	ECG PART No.	TCE PART No.	ZENITH PART No.	NOTES
MAIN BOARD						
D2	10B2 DAN202K	NTE116 NTE5019A NTE595	ECG116 ECG5019A ECG595	SK3311 SK10A/5019A	212-76-02 103-Z9010	USED SOME VERSIONS
D3						
D4						
D6						
D7	7.5M (10) DAN202K	NTE116 NTE595	ECG116 ECG595	SK3311	212-76-02	
D8						
D9 THRU D12						
D13						
D14 THRU D17	10L (10) DAN202K 4.7H (10) 24M (10)	NTE595	ECG595			
D100						
D101, 103						
D104						
D105	30L (10) HA13412 LB1205 74LS06(SM)					
D106						
IC1						
Q1,2						
Q3	M60201 M61048 LS05FP(SM) 2901(SM) HN27256G-25	NTE834SM	ECG834SM			
Q4						
Q5						
Q6						
Q7	D4168C-20 P8051AH M5128-20 PBL3717 LA5005					
Q8,9						
Q10						
Q11						
Q12						
Q13						
Q14, 15						
REG						

**CP51** OKIDATA MODEL  
MICROLINE 193 PLUS (GE8251P)



## PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

### SEMICONDUCTORS (Select replacement for best results)

ITEM No.	MFGR. PART No./ TYPE No.						NOTES
		NTE PART No.	ECG PART No.	TCE PART No.	ZENITH PART No.		
SCR	CR3CM8						
TR1	BF RE (10)						
TR2	D1 C (10)						
TR3	DTA114EK						
TR4	2SA1037K-R	NTE2415 NTE2409	ECG2415 ECG2409				
TR5	B882	NTE264	ECG264	SK3181A/264	121-Z9087		
TR6	DTA114EK	NTE2415	ECG2415				
TR7	2SC2412K-Q	NTE2408	ECG2408				
TR8	B858	NTE55	ECG55	SK9367/55			
TR9	DTA114EK	NTE2415	ECG2415				
TR100	2SC2412K-Q	NTE2408	ECG2408				
TR101, 2, 3	DTA114EK	NTE2415	ECG2415				
SERIAL INTERFACE BOARD							
D1, 2	DAN202K						
D3	10B3	NTE595	ECG595				
D4	M.C (10)	NTE116	ECG116	SK3313/116	212-76-02		
Q1	M80C51-45						
Q2	HD75154P						
Q3	SN75188N						
Q5, 6	74LS251(SM)						
Q7, 8	74LS75(SM)						
Q9		NTE75188	ECG75188	SK5188/75188	HE-443-794	USED SOME VERSIONS	
Q11	HM6116LFP-3						
Q12	74LS32(SM)						
TR1	EL (10)						
TR2	LA5005						
TR3	B858	NTE55	ECG55	SK9367/55			
TR4	2SC2412K-R	NTE2408	ECG2408				
TR5	2SA1037K-Q	NTE2409	ECG2409				

## PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

### CAPACITORS

ITEM No.	RATING	MFGR. PART No.
MAIN BOARD		
C29	.022 50V 2%	

ITEM No.	RATING	MFGR. PART No.
POWER SUPPLY		
C1	.0047 125VAC	
C2	.0047 125VAC	

### RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NTE PART No.	
MAIN BOARD				
R39	39 5% 3W WW			
R47	3000 5% 3W WW			
PRINT HEAD				
TH1	4400 Cold NTC			

### COILS & TRANSFORMERS

ITEM No.	FUNCTION	MFGR. PART No.	OTHER IDENTIFICATION	NOTES
L1	Line Filter			
T1	Power Transformer		3LP45474-2 (1)	(1) Number on unit.

### FUSE DEVICES

ITEM NO.	DESCRIPTION	MFGR. PART NO.		NOTES
		DEVICE	HOLDER	
<u>POWER SUPPLY</u>				
F1	2 Amp @ 250VAC Fast Acting			

### MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
LED 1	LED		Select, Green
LED 2	LED		Alarm, Red
LED 3	LED		Power, Green
M1	Motor		Space-Assembly
M2	Motor		Line Feed
M3	Print Head		
OSC	Crystal		12MHz
PE	Sensor		Paper Empty
SW1	Switch		Power
SW2	Switch		SASF (Semi-Automatic Sheet Feed)
SW3	Switch		Line Feed
SW4	Switch		Form Feed
SW5	Switch		Top of Form
SW6	Switch		Select

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# LOGIC CHART

## MAIN BOARD

PIN NO.	IC Q3	IC Q4	PIN NO.	IC Q4	PIN NO.	IC Q4	PIN NO.	IC Q5	PIN NO.	IC Q5	PIN NO.	IC Q5
1	H	P	21	H	41	H	1	P	21	P	41	H
2	L	P	22	P	42	H	2	P	22	P	42	H
3	L	P	23	P	43	*	3	P	23	H	43	H
4	H	P	24	P	44	H	4	P	24	L	44	H(2)
5	L	P	25	H	45	L	5	P	25	P	45	P
6	H	P	26	H	46	P	6	P	26	P	46	L
7	L	P	27	*	47	P	7	P	27	P	47	H
8	L	P	28	*	48	P	8	P	28	P	48	H(1)
9	H	P	29	H	49	H	9	P	29	P	49	H(1)
10	H	P	30	H	50	L	10	P	30	P	50	L(1)
11	L	P	31	L	51	P	11	P	31	H	51	L(1)
12	L	P	32	L	52	P	12	P	32	H	52	L(1)
13	H	P	33	H	53	P	13	P	33	H	53	L
14	H	P	34	H	54	P	14	P	34	H(2)	54	L
15		*	35	H	55	P	15	P	35	L	55	P
16		P	36	H	56	*	16	P	36	L	56	P
17		P	37	H			17	P	37	H(3)	57	P
18		P	38	H			18	P	38	H(4)	58	P
19		H	39	H			19	P	39	H(5)	59	P
20		H	40	H			20	P	40	H(6)	60	P

PIN NO.	IC Q6	IC Q7	PIN NO.	IC Q8	PIN NO.	IC Q8	PIN NO.	IC Q9	PIN NO.	IC Q9
1	P	P	1	H	15	P	1	H	15	P
2	P	L	2	P	16	P	2	P	16	P
3	*	H	3	P	17	P	3	P	17	P
4	L	H	4	P	18	P	4	P	18	P
5	*	*	5	P	19	P	5	P	19	P
6	L	*	6	P	20	P	6	P	20	P
7	L	P	7	P	21	P	7	P	21	P
8	P	P	8	P	22	P	8	P	22	P
9	P	*	9	P	23	P	9	P	23	P
10	P	H	10	P	24	P	10	P	24	P
11	P	*	11	P	25	P	11	P	25	P
12	H	L	12	P	26	P	12	P	26	P
13	L	L	13	P	27	P	13	P	27	P
14	H	L	14	L	28	H	14	L	28	H



# LOGIC CHART (Continued)

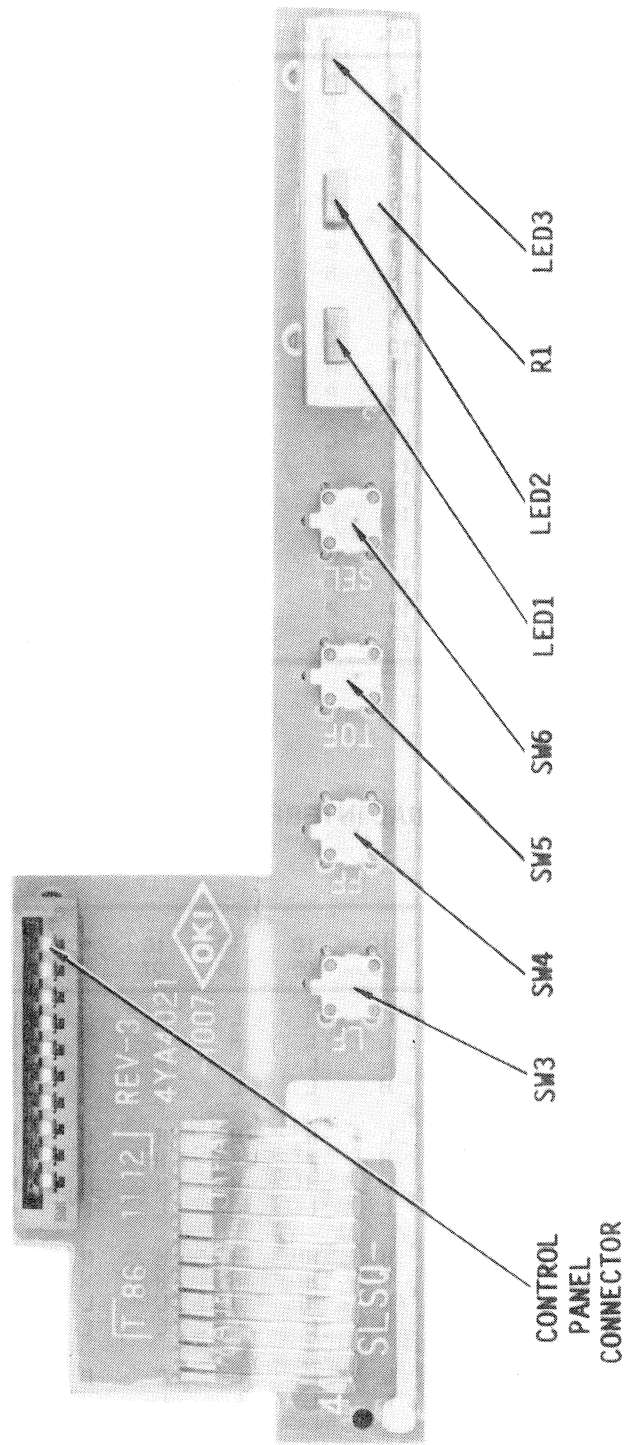
## MAIN BOARD

PIN NO.	IC Q10	PIN NO.	IC Q10	PIN NO.	IC Q12	PIN NO.	IC Q12	PIN NO.	IC Q13	PIN NO.	IC Q13
1	P	15	P	1	P	21	P	1	P	13	P
2	P	16	P	2	P	22	P	2	P	14	P
3	P	17	P	3	P	23	P	3	P	15	P
4	P	18	P	4	P	24	P	4	P	16	P
5	P	19	P	5	P	25	P	5	P	17	P
6	P	20	P	6	P	26	P	6	P	18	P
7	P	21	P	7	P	27	P	7	P	19	P
8	P	22	P	8	H	28	P	8	P	20	P
9	P	23	P	9	L	29	P	9	P	21	P
10	P	24	P	10	H	30	P	10	P	22	P
11	P	25	P	11	H	31	H	11	P	23	P
12	P	26	H	12	P	32	P	12	L	24	H
13	P	27	P	13	L	33	P				
14	L	28	H	14	P	34	P				
				15	P	35	P				
				16	P	36	P				
				17	P	37	P				
				18	P	38	P				
				19	P	39	P				
				20	L	40	H				

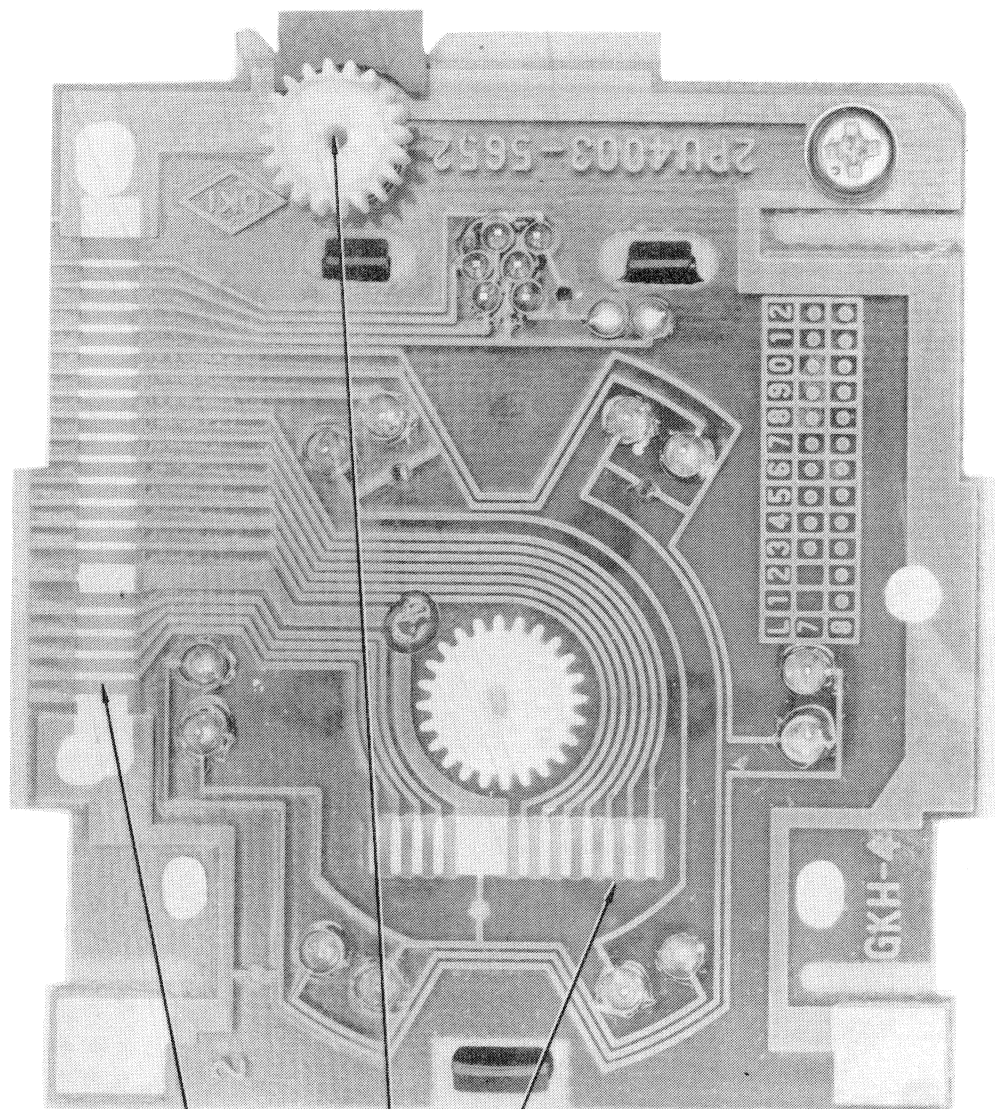
## SERIAL INTERFACE BOARD

PIN NO.	IC Q1	PIN NO.	IC Q1	PIN NO.	IC Q2	IC Q3	IC Q5	IC Q6	IC Q7	IC Q8	IC Q11	PIN NO.	IC Q11	PIN NO.	IC Q12
1	H	21	H	1	L	L	H	L	L	L	H	13	H	1	H
2	H	22	H	2	L	L	L	L	H	H	H	14	H	2	H
3	H	23	H	3	L	H	L	L	H	H	H	15	H	3	H
4	H	24	H	4	L	H	L	L	P	P	H	16	H	4	H
5	H	25	H	5	L	L	H	H	H	H	H	17	H	5	H
6	H	26	H	6	L	H	*	*	H	H	H	18	H	6	H
7	H	27	H	7	L	L	H	H	H	H	H	19	H	7	L
8	H	28	H	8	L	L	L	L	L	L	H	20	H	8	P
9	L	29	H	9	H	H	H	H	H	H	H	21	H	9	P
10	H	30	P	10	H	H	H	H	H	H	H	22	H	10	L
11	H	31	H	11	H	H	H	H	L	L	H	23	H	11	H
12	L	32	H	12	H	H	L	H	L	L	L	24	H	12	H
13	H	33	H	13	H	L	L	L	P	P				13	H
14	H(2)	34	H	14	H	H	L	L	L	L				14	H
15	H	35	H	15	H		L	H	H	H					
16	H	36	H	16	H		H	H	H	H					
17	H	37	H	17											
18	P	38	H	18											
19	P	39	H	19											
20	L	40	H	20											

OKIDATA MODEL  
MICROLINE 193 PLUS (GE8251P)



OKIDATA MODEL  
MICROLINE 193 PLUS (GE8251P)



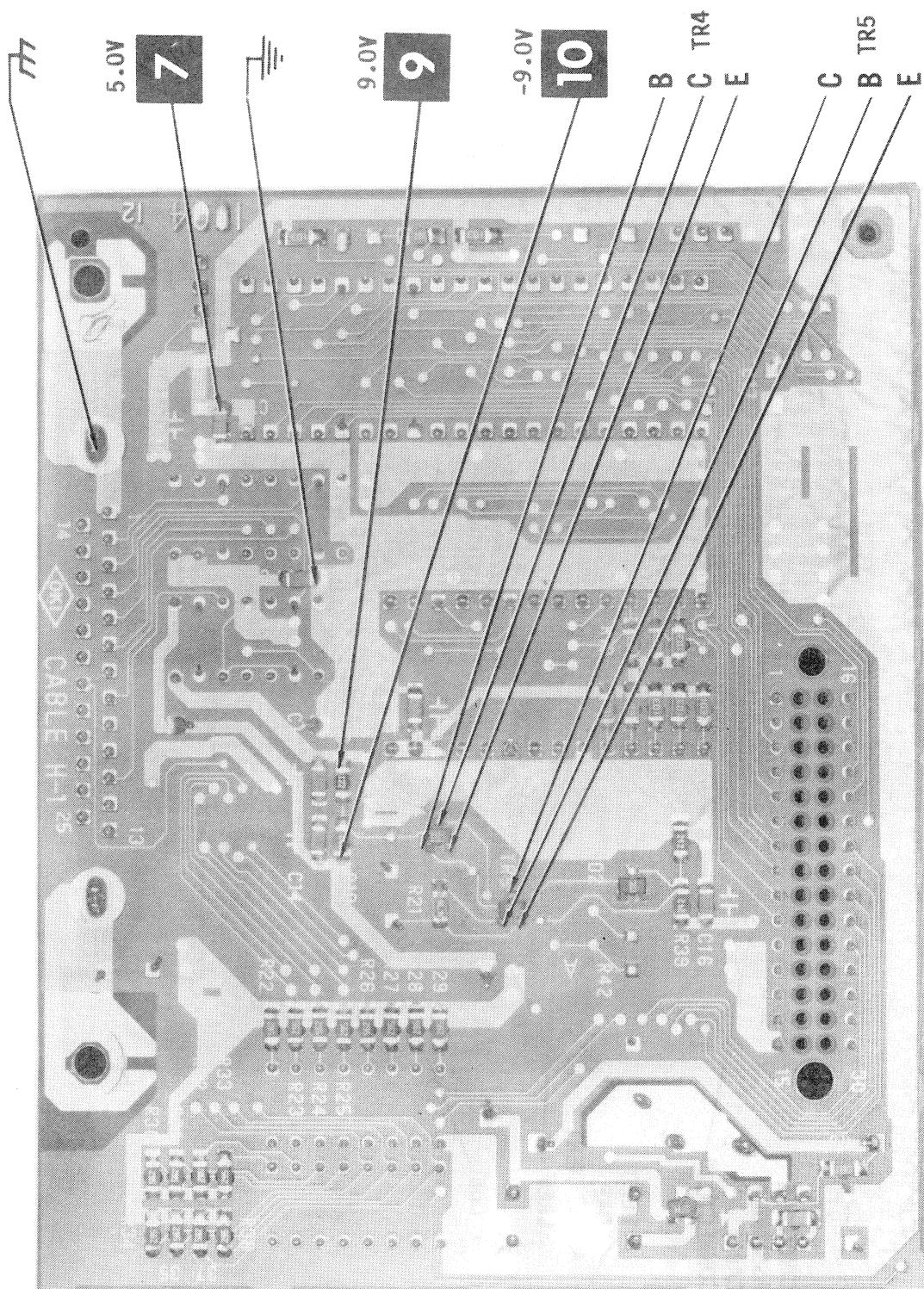
CARRIAGE  
ASSEMBLY  
CABLE  
CONNECTOR

HEAD  
GAP  
ADJUSTMENT  
SCREW

CN6

SPACE (CARRIAGE) MOTOR BOARD



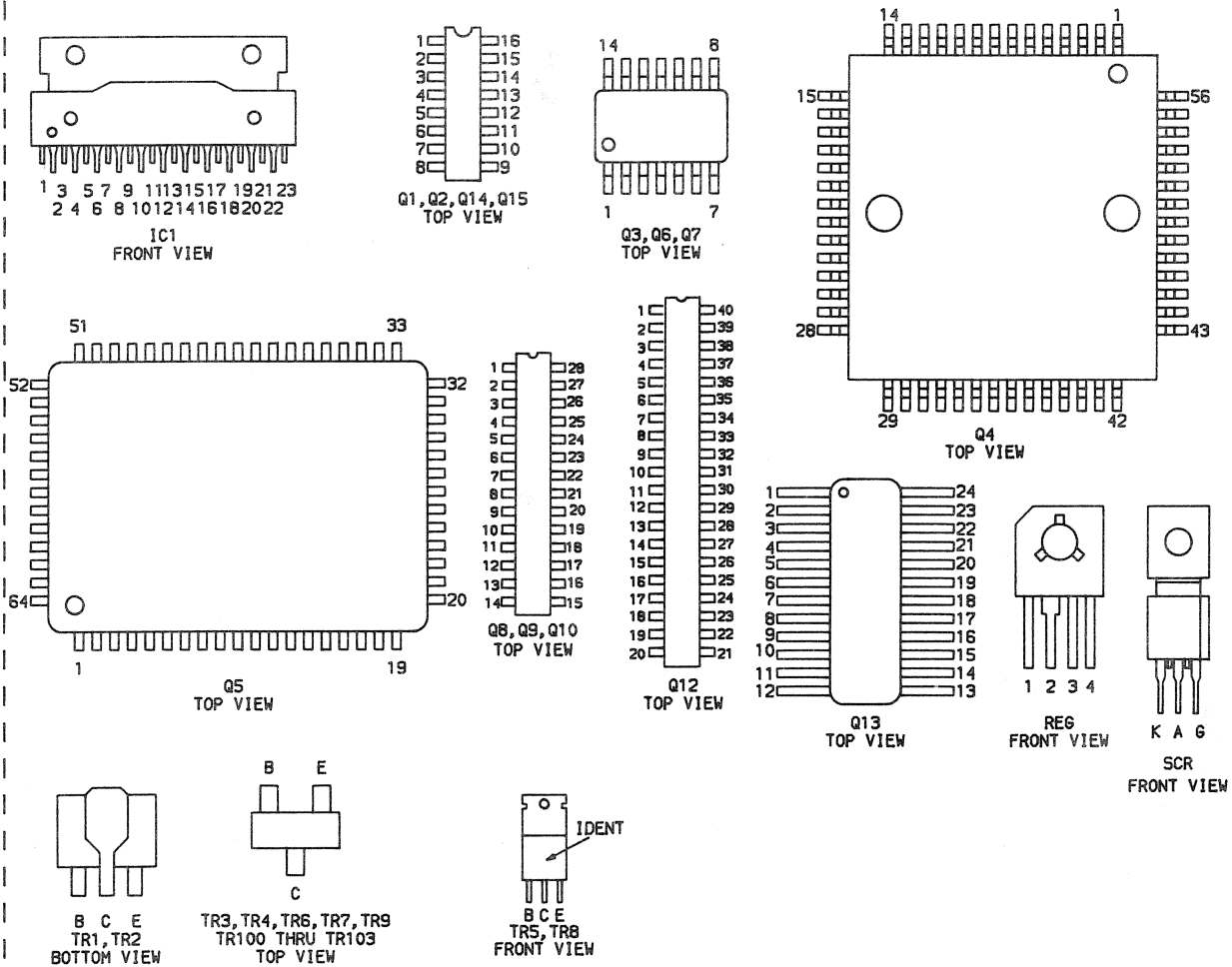


## 25

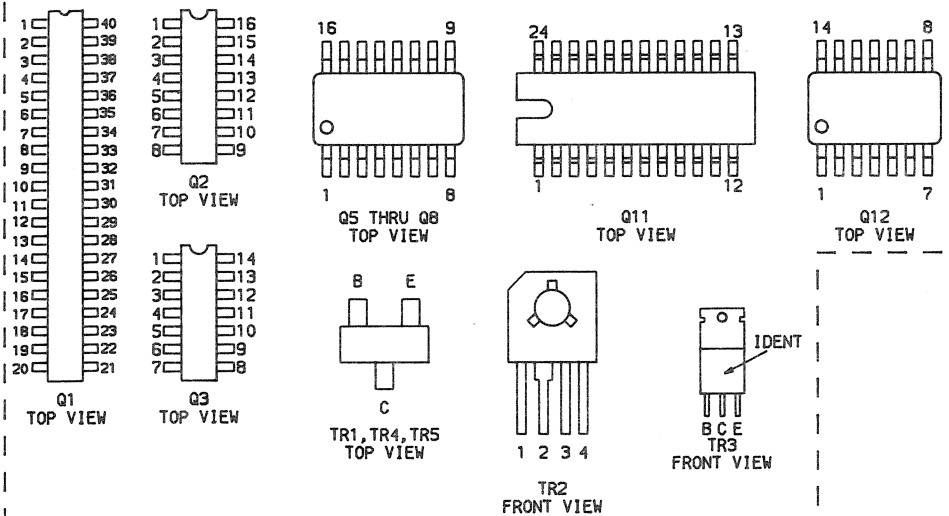


## IC PINOUTS & TERMINAL GUIDES

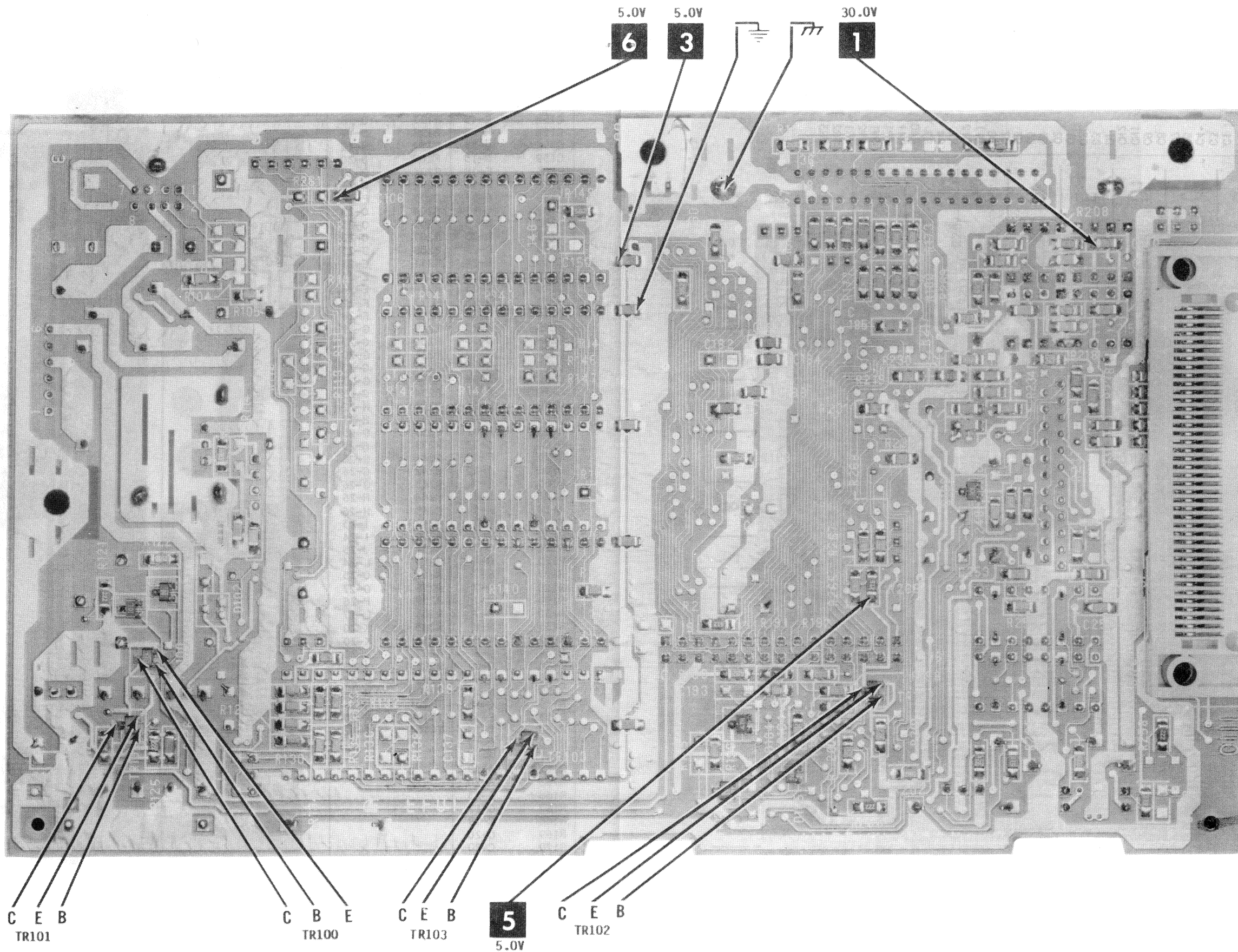
### MAIN BOARD



### SERIAL INTERFACE BOARD







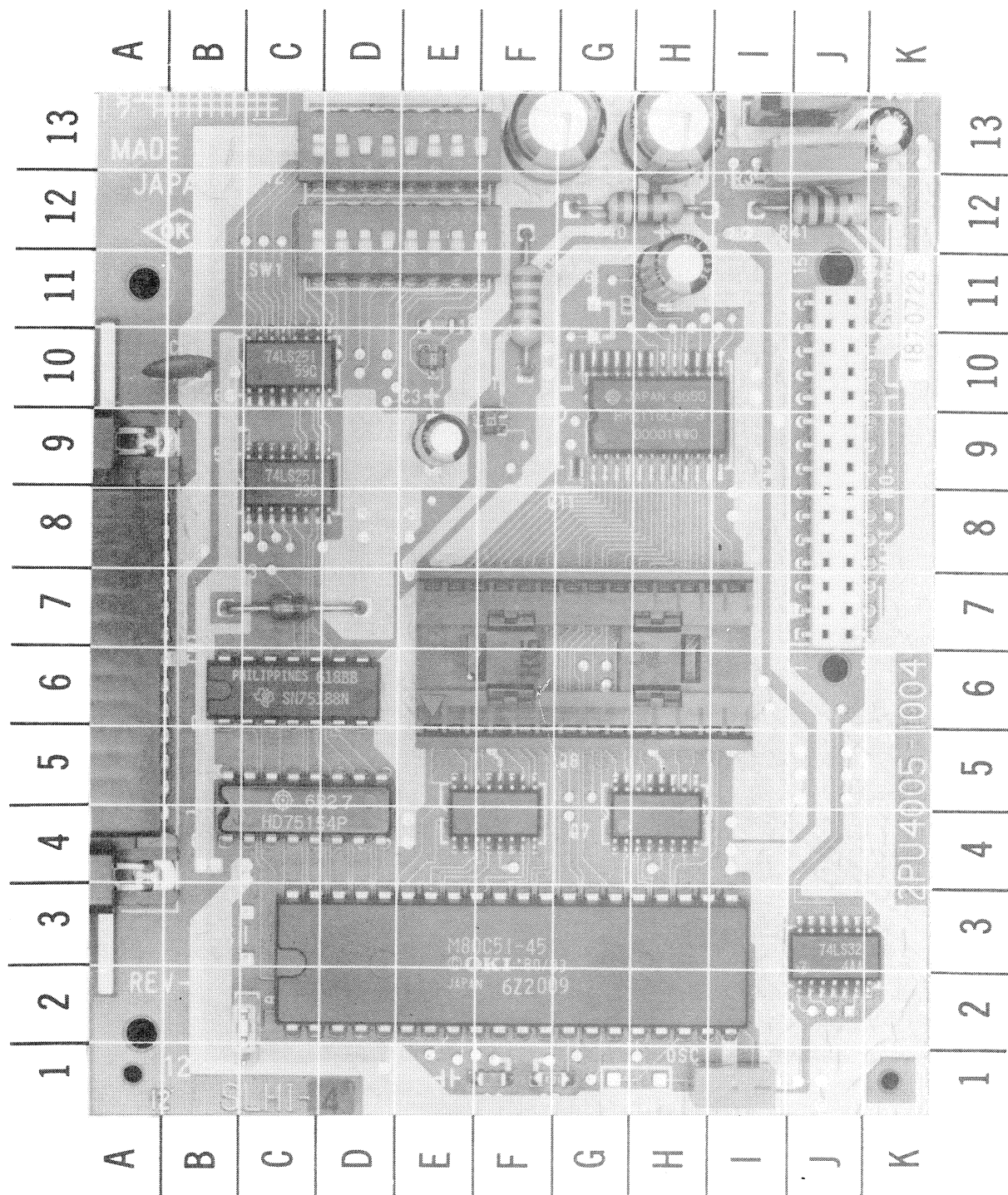
MAIN BOARD - BOTTOM VIEW

A Howard W. Sams CIRCUITRACE Photo

MAIN BOARD - BOTTOM VIEW

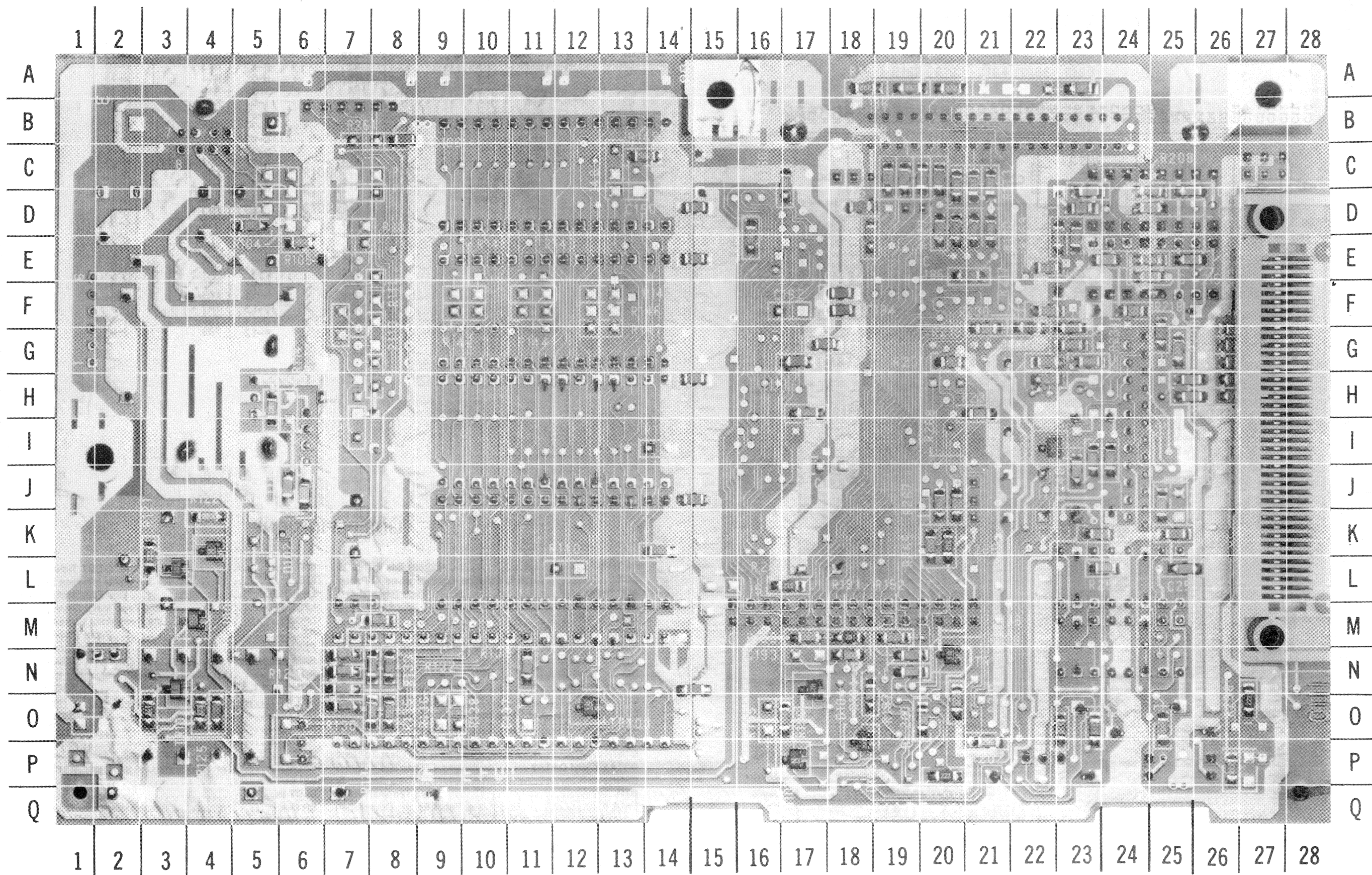


GridTrace  
LOCATION GUIDE



B-10	C1
E-9	C3
F-13	C4
H-13	C5
H-11	C7
K-13	C8
F-1	C9
A-4	CN1
J-7	CN2
E-10	D1
C-7	D3
I-1	OSC
C-2	Q1
B-4	Q2
B-6	Q3
C-8	Q5
C-10	Q6
G-4	Q7
E-4	Q8
G-9	Q11
J-2	Q12
F-11	R2
E-11	R4
F-1	R7
H-12	R40
J-12	R41
C-2	SP1
C-12	SW1
C-13	SW2
F-9	TR1
J-13	TR2
J-13	TR3





OKIDATA MODEL  
MICROLINE 193 PLUS (GE8251P)

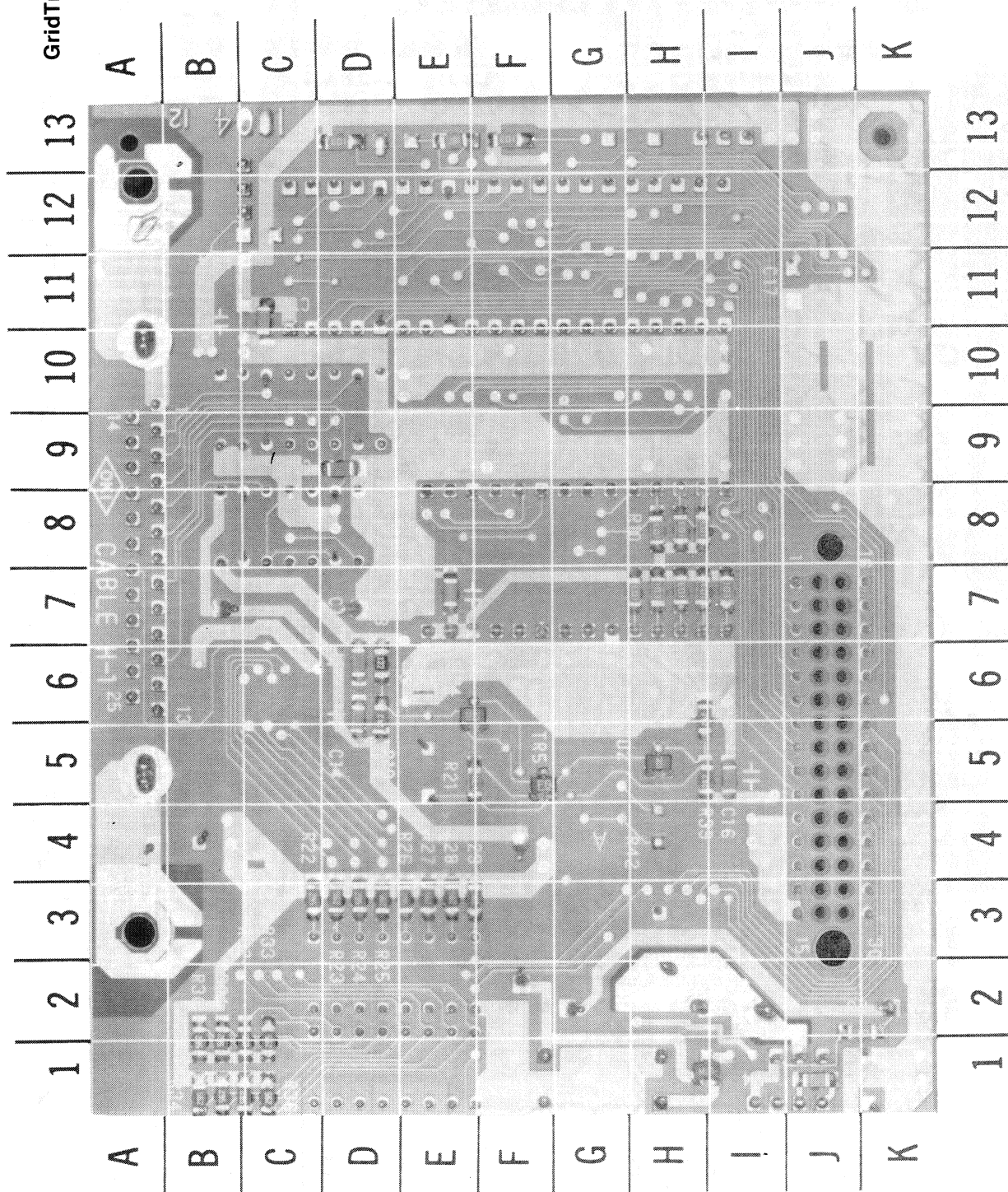
MAIN BOARD - BOTTOM VIEW

A Howard W. Sams GRIDTRACE™ Photo

MAIN BOARD - BOTTOM VIEW



## GridTrace LOCATION GUIDE



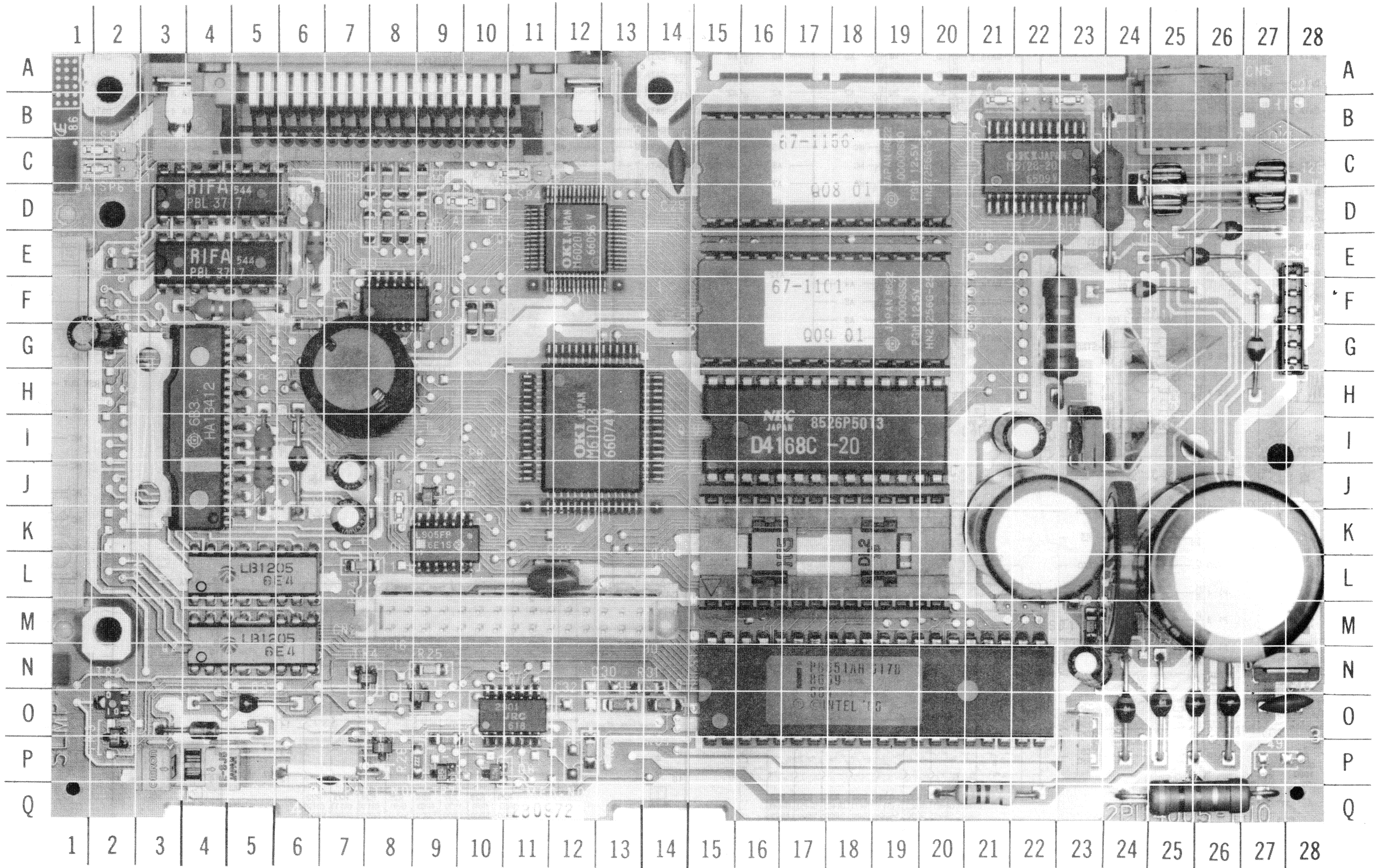
C-11  
D-9  
E-7  
D-6  
D-6  
I-5  
J-1  
H-5  
H-1  
D-13  
E-13  
F-13  
K-2  
H-8  
H-8  
H-8  
H-7  
H-7  
H-7  
H-7  
I-7  
D-6  
D-6  
E-5  
C-3  
D-3  
D-3  
D-3  
E-3  
E-3  
E-3  
B-1  
B-1  
C-1  
C-1  
B-1  
B-1  
C-1  
C-1  
H-6  
H-5  
E-6  
E-5

C10  
C11  
C12  
C13  
C14  
C16  
C44  
D2  
D4  
R5  
R6  
R8  
R9  
R10  
R11  
R12  
R13  
R14  
R15  
R16  
R17  
R18  
R19  
R21  
R22  
R23  
R24  
R25  
R26  
R27  
R28  
R29  
R30  
R31  
R32  
R33  
R34  
R35  
R36  
R37  
R38  
R39  
R4  
R5  
R15

**SERIAL INTERFACE BOARD - BOTTOM VIEW**

A Howard W. Sams **GRIDTRACE™** Photo





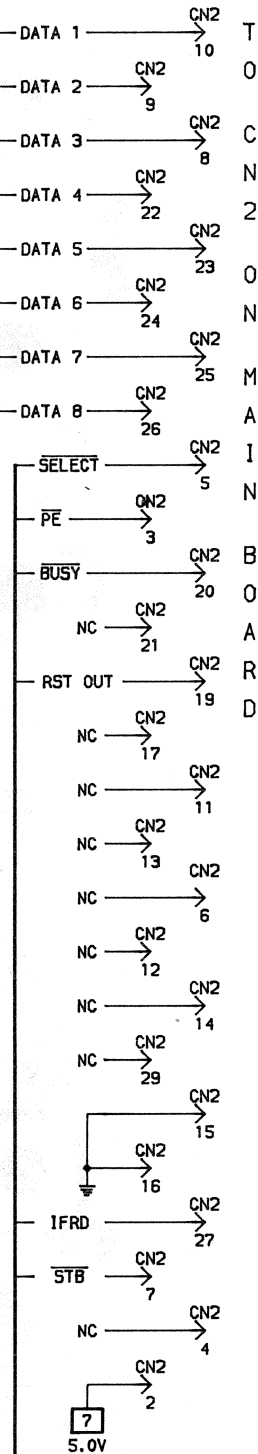
OKIDATA MODEL  
MICROLINE 193 PLUS (GE8251P)

MAIN BOARD - TOP VIEW

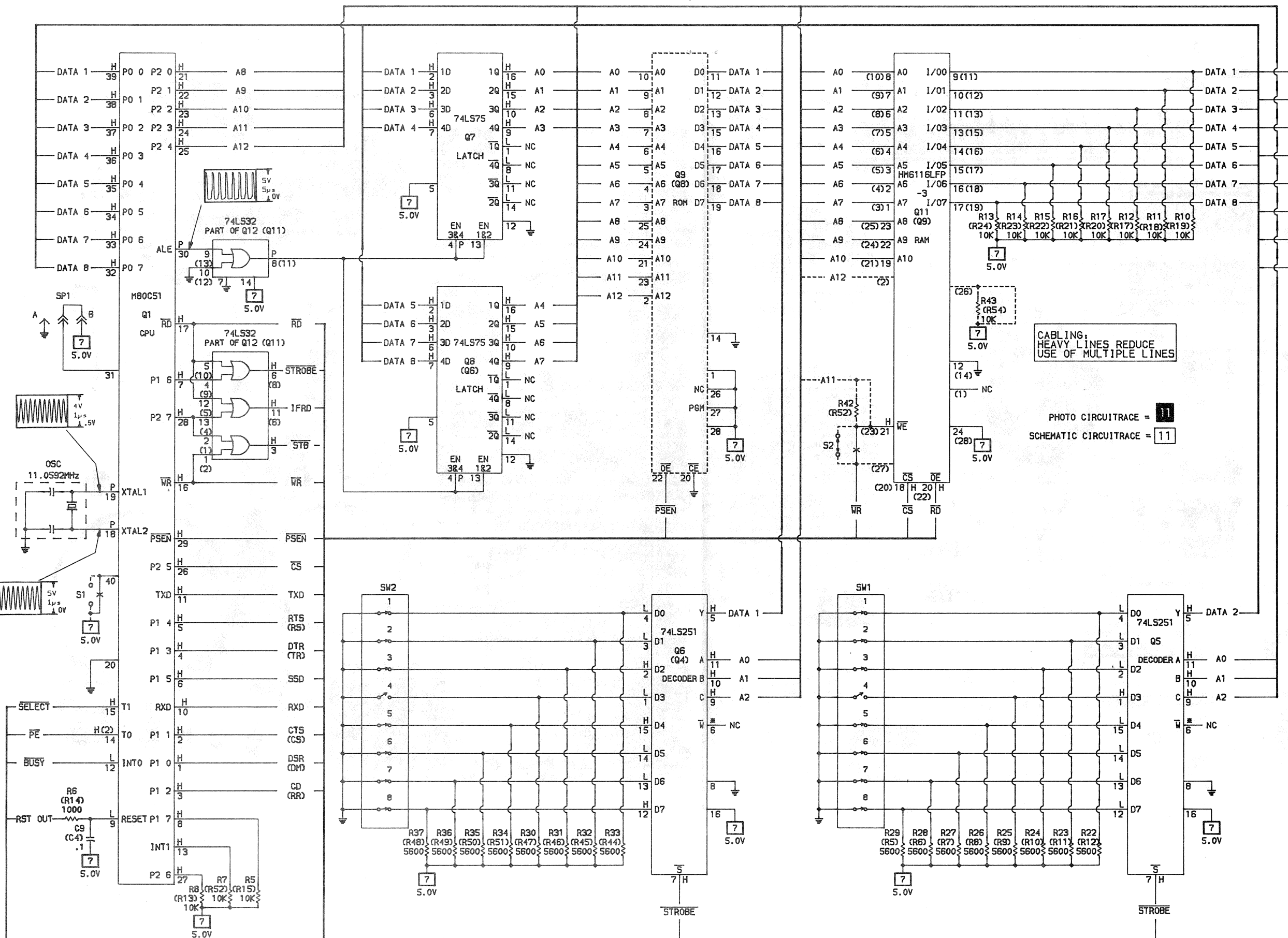
A Howard W. Sams GRIDTRACE™ Photo

MAIN BOARD - TOP VIEW





SERIAL INTERFACE BOARD



A PHOTOFAC STANDARD NOTATION SCHEMATIC

WITH CIRCUITRACE

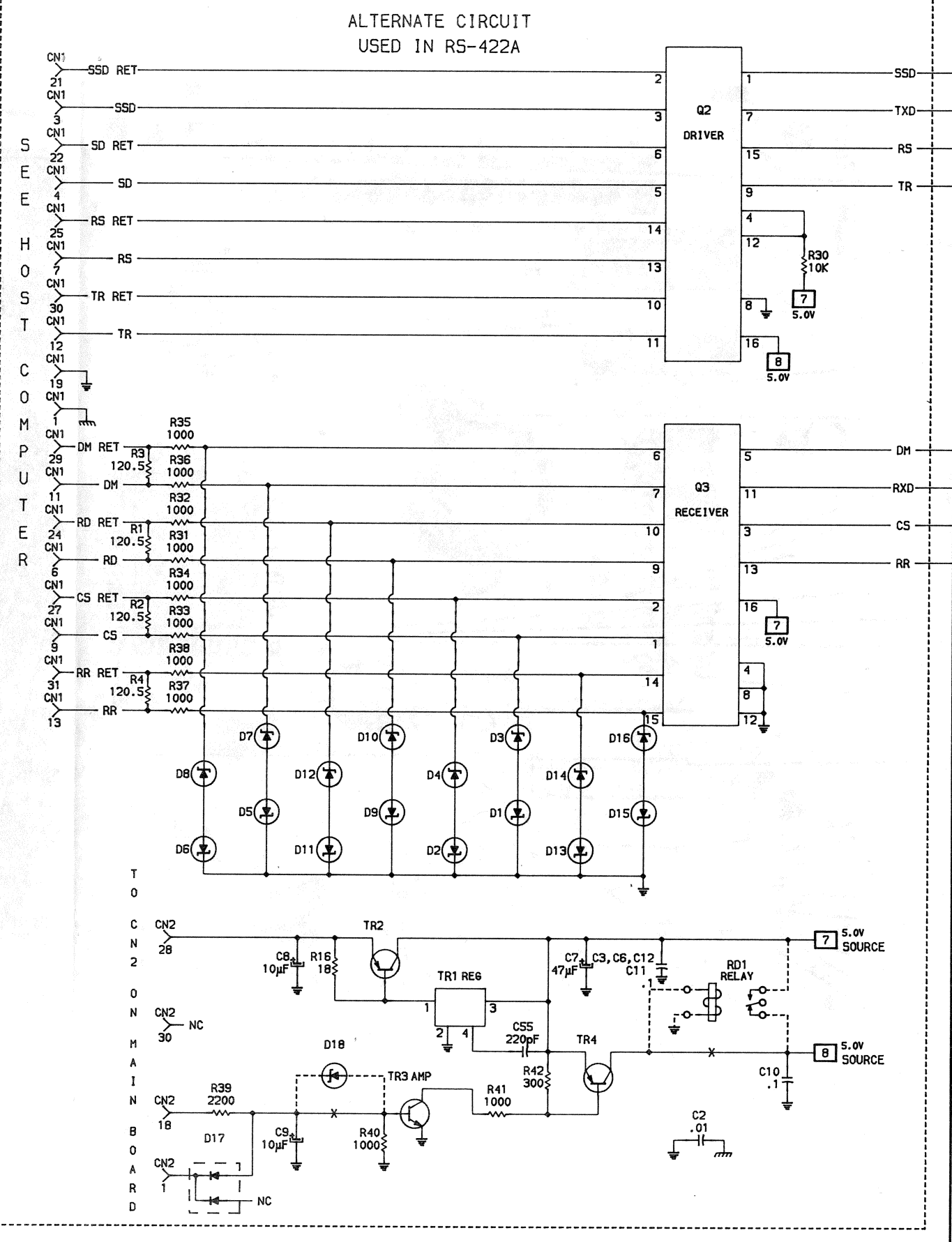
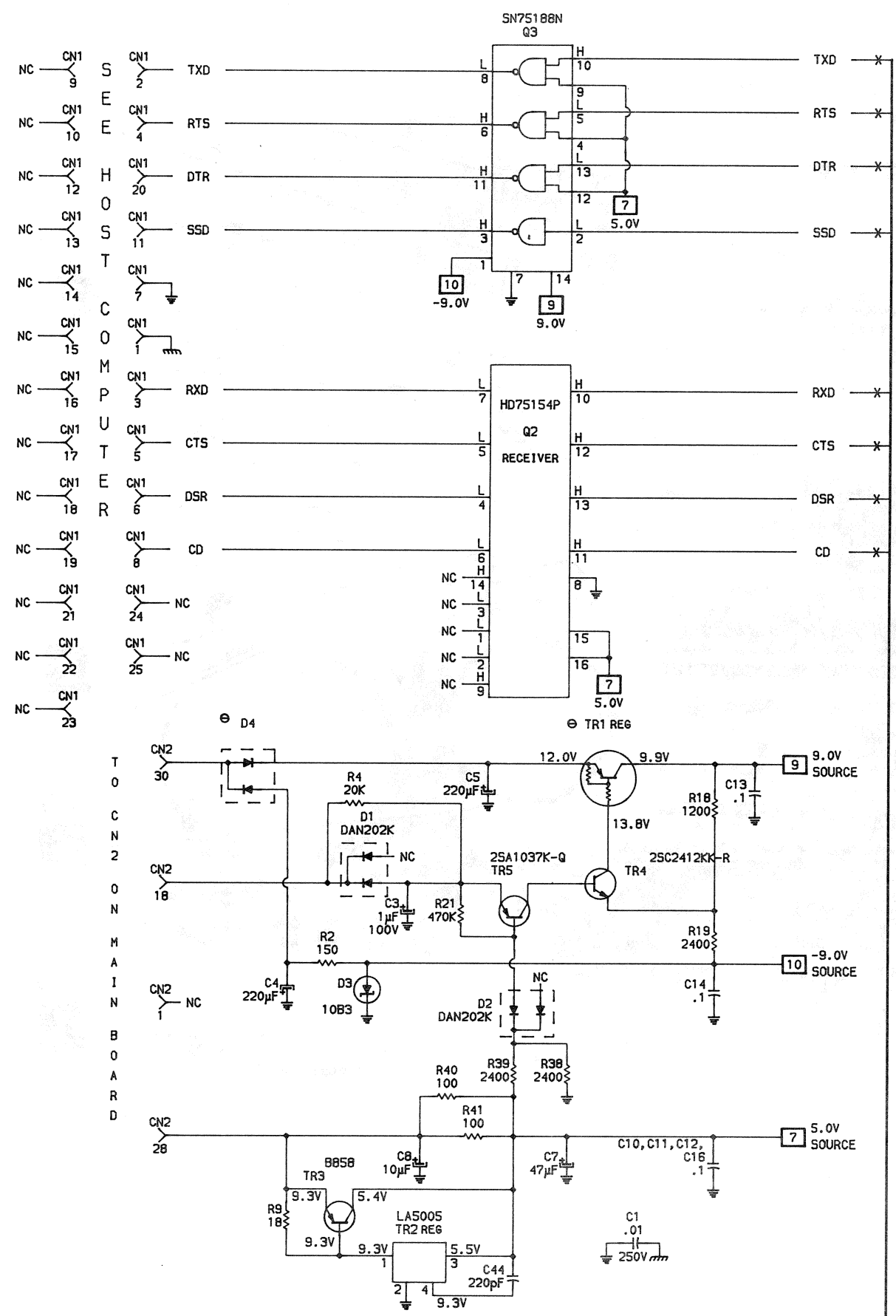
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SERIAL INTERFACE BOARD





### MAIN BOARD - TOP VIEW



A PHOTOFAC STANDARD NOTATION SCHEMATIC  
WITH CIRCUITTRACE  
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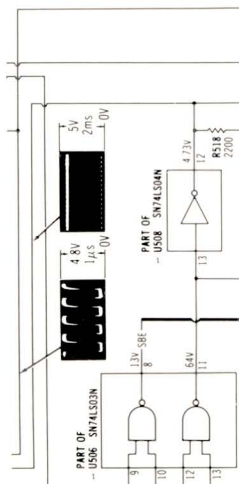


Remove staples and use cover for file folder.

- Quick Component Location using the SAMS exclusive GRIDTRACE, CIRCUITRACE, and component photographs.

The following information is just a sample of the many valuable time saving features contained in this exclusive Sams COMPUTERFACTS publication:

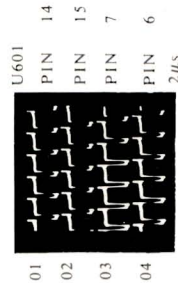
- Preliminary Service Checks section is an easy to use, step by step guide for the experienced technician or hobbyist, and even beginners.
- SAMS famous industry accepted standardized notation schematics containing CIRCUIT TRACE<sup>®</sup>, GRID TRACE<sup>™</sup>, waveforms, voltages and stage identification.



- Step by Step Troubleshooting guides the technician through the necessary procedures to quickly locate the problem.

## MICROPROCESSOR CHIP (CPU) OPERATION

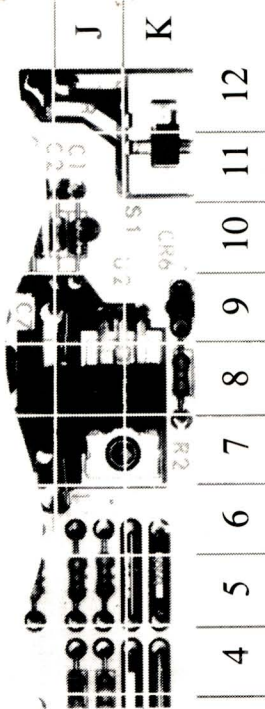
Verify the processor is functioning by checking the signals on the address lines (pins 10 thru 24 of IC U600) and the data lines (pins 41 thru 56) using a logic probe or a scope if a logic probe is used, refer to the "Logic Chart" for the correct readings. If a scope is used, the waveforms on the address lines (except pins 22 and 23 which have no signal in Power Up mode) should be similar to Figure 1. The waveforms on the data lines should be similar to Figure 2.



- Logic Chart containing logic probe readings to isolate defective circuitry and components.

# LOGIC

PIN NO	IC U100	PIN NO	IC U100	PIN NO	IC U102	IC U103	IC U104	IC U105	IC U106	IC U107	IC U108	IC U109
1	P	21	P	1	1	1	1	1	1	1	1	1
2	P	22	P	2	P	P	P	P	P	P	P	P
3	P	23	P	3	P	H	H	H	H	H	H	H



- **Complete Components Parts List** in an easy to use format with field replacements shown when possible. SAMS unique semiconductor, chip and IC cross-reference gives you many replacements to choose from and is available at your Electronic Distributor.

## SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No.	MFGR. Part No.	REPLACEMENT DATA				NOTES
			ECG Part No.	NTE Part No.	RCA Part No.	/ENITH Part No.	
D102	1SS53	1149-2576	ECG519	NTE519	SK9091/177	103-131	
D103	2N60FM	1149-2527	ECG109	NTE109	SK3088	103-Z9001	
D201	1N4004GP	1201-4205	ECG116	NTE116	SK3312	212-76-02	
D501 thru D503	1SS53	1149-2576	ECG519	NTE519	SK9091/177	103-131	

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